THE COMPOSITION AND EMERGENCE OF AN ORGANIZATIONAL CODE

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The very things that provide firms with advantages in the present may undermine their future viability. This dualism pervades the organizational and strategic management literature and leads to theorization of core organizational constructs as embodying trade-offs between stability and change. For example, the concept of organizational code focuses on how organizations structure information representation to enhance coordination effectiveness and efficiency; yet, efficiency comes at the cost of information loss. Economic-based organizational theories treat the code as an integral, yet inertial part of an organization's invested infrastructure, inseparable from the organization's historical-cognitive context, and understood across the entire organization. By conceptualizing forces for continuity and change as dualities, I show how the organizational code acts as a mechanism by which organizations manage these tensions. In an abductive, longitudinal case study of communication by and within a large, multi-national pharmaceutical company from 1985 to present, I examine firm-specific language and how this language emerges. I find that, when the code is discernable as firm-specific language, it typically has more to do with change than stability. Codified blueprints for practice are an exception to this, but these play a role more akin to proprietary technology or boundary objects than to theoretical conceptualizations of the organizational code. When an organization recognizes some need to change, there is an emergent or deliberate effort to articulate what that change should look like. The emergence of the code happens through these efforts to create a novel conceptual space with unique words, acronyms, phrases, and visuals (WAPVs). This new

language, with its firm-specific meaning, has an important effect on how a firm creates value. It becomes meaningful as 'use cases' for it are identified, enabling translation into practice and mindsets. Once an organization generates a use case 'catalogue' for new WAPVs, members better understand why change is needed, what work needs to happen, and how that work gets done. By showing how an organization transforms the 'language we use to get work done' into new practices and ways of thinking that enrich the organizational code, I explain how dualities of continuity and change are managed over time.

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PREFACE

Before you lies my dissertation, the basis of which can be traced to my own curiosity of figuring out what exactly firm-specific organizational language is – what the literature has called organizational code. It has been written to fulfill the graduation requirements of the Strategic Management Program at the University of Pittsburgh's Joseph M. Katz Graduate School of Business. As an active duty officer, the Air Force provided me the opportunity to complete this PhD program from August 2014 to June 2018. I was engaged in researching and writing this dissertation from April 2017 to June 2018.

I, together with my advisor, Sue Cohen, abductively approached the project to extensively investigate one company's organizational code. Part of that process meant that my research question was formulated and re-formulated many times. I had the chance to formally present my ideas and findings to my committee at three different program milestones. Based on feedback received, I was able to continually narrow the scope of my research and fine-tune my theoretical contribution. I would like to thank my committee members for their excellent guidance and support during this process.

Our research included both an outsider perspective, when we examined external communication events of the company from 1985 to present, as well as an insider perspective, when we conducted interviews with current and former company employees to inquire about its internal language. For this insider perspective, I wish to thank all of my interviewees; without

their cooperation and rich and detailed recollections, I would not have been able to conduct this analysis.

Further, I would not have been able to fully complete this investigation and answer my research question [and within the timeframe allowed by the Air Force] had it not been for Sue. Batting around ideas with you is just scratching the surface, in terms of the benefits from our relationship. You truly 'practice what you preach' [in the classroom, at home, and in your own research], fostering and sustaining innovative practices. You've been so committed to working right alongside me on this dissertation journey, ever willing to think through questions, provide invaluable feedback, suggest related literature to read, and encourage and inspire me along the way. I am forever grateful!

Finally, a huge thank you [and apology] goes to my husband, Andrew Bulger, for standing by my side throughout it all – my constant in a variable world. I would like to say the support was mutual but that's not the case. You kept our family afloat. Thank you!

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1.0 INTRODUCTION

Organizations embody inherent trade-offs. Efficiency and reliability come from continuity, while flexibility and adaptability require change. This dualism pervades the organizational and strategic management literature (Farjoun, 2010) and leads to a conundrum: The very things that provide firms with advantages in the present may undermine their future viability. A promising theoretical stream has begun to conceptualize the forces for continuity and change as dualities, in which certain facets of stability enable dynamic change processes (Feldman, Pentland, D'Adderio, & Lazaric 2016; Graetz & Smith, 2008; Sutherland & Smith, 2011; Smith & Lewis, 2011). This dualistic approach could reveal activities that reinforce current efficiencies and simultaneously enable the adaptations and transformations that sustain a firm's viability over the long term.

The juxtaposition of practice theory and the economic and sociological theories' conceptualization of organizational code offers a potential [duality-embracing] mechanism to help us better understand how organizations manage these tensions. On the one hand [of stability], the concept of organizational code, which is comprised of the shared meaning of words that are not similarly understood outside a firm, focuses on how organizations structure information representation to enhance coordination effectiveness and efficiency (Arrow, 1974, Williamson, 1991; Nickerson & Zenger, 2004). On the other hand [of change], language

pragmatics, grounded in the concept of 'language games' (Wittgenstein, 1953) and in the theory of speech acts (Austin, 1962; Searle, 1969), addresses how language is *actually* used in organizations – "where people do not use language primarily to make accurate representations of perceived objects, but, rather, to accomplish things" (Alvesson & Karreman, 2000). For example, in the process of innovation, narratives are conceptualized as flexible, cultural mechanisms that can bridge boundaries across people, space, and time (Bartel & Garud, 2009). The pragmatics stream concerns itself with studying the ways in which context contributes to meaning, and suggests that a particular element of the code can be used for very different purposes. The code is theorized to support efficient information processing and knowledge transfer and recombination across established interfaces within the firm (Arrow, 1974; Kogut & Zander, 1992). If elements of the code can be flexibly recombined, it might also support profound changes in a firm's approach to value creation.

However, the literature does not address whether, when, or how the organizational code enables a firm to simultaneously manage current demands and seed a path toward fundamental transformation. To guide this inquiry and identify the loci of mutually constitutive forces of continuity and change in the organizational code, I pose the following research question: *What comprises the organizational code, and how does it emerge?* In this paper, I define organizational code as the language an organization's members use to coordinate and to discuss the why, what, and how of key value-creating and capturing activities. The *why* is implied or made explicit by leadership's strategic imperatives but also comes from resonance with established mindsets. The *what* refers to the work organizational members do and the scope of that work. The *how* pertains to the practices used to accomplish the work. Use cases help to delineate the what and the how. For example, repurposing molecules names a new activity that

the organization may not have been doing and potentially alters the boundaries, or scope, of the work considered to be drug discovery. It also suggests new ways of carrying out drug discovery, as there may be several more granular – categorically different – ways to do drug discovery.

Applying a practice lens, I describe the mutual constitution of the organizational code *and* its practice as a mechanism by which dualities can be observed (Orlikowski & Feldman, 2011). I focus on the reconstruction of the code through the recombination of its distinctive elements, in part, by identifying meaningful speech acts, semiotic sequences, and following how they integrate in larger units of discourse over time (Warglien, 2013). I use an abductive research approach to simultaneously analyze the data and develop theoretical insights (Tavory & Timmermans, 2014).

I find that when the code is discernable as firm-specific language, it typically has more to do with change than stability, which reveals how these dualities are managed. Codified blueprints for practice are an exception to this, but these play a role more akin to proprietary technology or boundary objects than to theoretical conceptualizations of the organizational code. New language (that is firm-specific and has an important effect on how a firm creates value) becomes meaningful as use cases for it are identified and that enable its translation into practice and mindsets. As an organization transforms firm-specific language into practices and ways of thinking, it gradually disappears from discourse. By explaining how organizations continually reconstruct meaning through the enactment of novel words and the creation of new practices, which mutually constitute one another, I elucidate how the organizational code, as the 'language we use to get work done,' facilitates a balance in continuity and change. The performative and ostensive enactments of the code in practice enable an understanding of the consequentiality of its dual nature.

The remainder of this paper proceeds as follows. First, I provide a brief synopsis of the creative process of abductive reasoning and its usefulness in discovering and validating patterns that are not predefined (Locke, Golden-Biddle, and Feldman, 2008). Then, I describe the problematization process, as elaborated by Alvesson and Sandberg (2011), which I use to develop alternative assumptions about the organizational code, reflecting the tenants of a practice lens and pragmatics lens. Following a brief review of the literature I used to establish theoretical suppositions, I describe and justify the context for this study. The archival data used includes the externally directed and publicly available communications of members (mainly CEOs) of MEDRx & Company[1] from 1985 to present, journal and media articles in science and technology fields, case studies of the company, and qualitative interviews with experts in the broader healthcare industry and elite informants who are and/or were employed by MEDRx. I provide a succinct overview of the stages of my abductive analyses and theorizing. An important part of this process is to note surprises and insights gained through iteration between the data and theory. I conclude by elaborating the primary theoretical contribution of this study: an elaboration of the organizational code construct, as a mechanism by which firms adapt[2] and/or transform the beliefs, mindsets and practices of its members, as it relates to the 'language we use to get work done.'

[1] MEDRX is a pseudonym for the drug manufacturer, used to protect the confidentiality of individuals, since interviews with past and present employees were subsequently conducted.

[2] Here, I define adapt as the firm changing to better fit its context/environment and survive in the future. They do this by creating language, and thus a new conceptual space, to lead change and innovation in practices.

2.0 THEORETICAL APPROACH

2.1 ABDUCTIVE THEORIZATION

2.1.1 Abduction

While several theories incorporate some conceptualization of the organizational code (e.g. transaction cost economics (TCE), and the knowledge-based view (KBV), there is very little empirical research documenting its composition or the processes by which it emerges, evolves, or endures. Given this lack of an evidence base, I study this process abductively. Abductive analysis is a qualitative data analysis approach grounded in pragmatism and aimed at theory construction. It has a logical form, distinct from both induction and deduction that allows for the discovery and justification of new theoretical insights to be intertwined. Those two steps in theory building are not separate but integrally related. As opposed to deduction, which proves that something must be, and induction, which shows that something actually is, abduction suggests what may be.

The theoretical engine of abduction is the creative, yet systematic, iteration between specific types of variation in the data and alternative theoretical lenses (Tavory & Timmermans, 2014). Important elements of the abductive process include defining constructs in terms of consequences, rather than constitutive elements, repeatedly asking why something is so (i.e.

engaging doubt), drawing from multiple theoretical perspectives to address why, and attending to surprise (i.e. theoretical suppositions that are not evident in the data (Locke et al., 2008).

Additionally, theoretical insights come from the systematic analysis of variation – similarities and dissimilarities across instances of the unit of analysis, situations in which the observations occur, and over time. Respectively, these constitute sources of dataset, inter-situational, and temporal variation. As I am fundamentally interested in language, I focus on speech acts – and semiotic sequences of speech acts – as the unit of analysis for this study. This allows me to consider alternative approaches to bounding the construct of organizational code and to observe how it emerges, evolves, and endures.

Tavory and Timmermans (2014) stress the importance of field-note writing, transcribing interviews, systematic archival work, and coding/memo writing to detect theoretical themes in a "word-by-word, line-by-line, paragraph-by-paragraph, observation-by-observation fashion" to make sure ideas are checked against the empirical. This analytical approach assures fit, plausibility, and relevance to the existing literature.

2.1.2 Problematization Methodology

Problematization[3], as part of the abductive process, is a method of questioning the established assumptions about a construct. The first step in problematization is "to enter a dialectical interrogation between one's own and other meta-theoretical stances so as to identify, articulate, and challenge central assumptions underlying existing literature in a way that opens up new areas

[3] See Appendix A for output tables from this problematization process, which include summaries of the current and alternative constitutive and epistemological assumptions of organizational code as well as future research questions and their methodological implications.

of inquiry" (Alvesson & Sandberg, 2011; p. 255). Following Feldman's work on routines and resources[4], I drew upon practice theory and pragmatics to question prevalent assumptions about the organizational code in the literature where it is a central construct.

2.2 THEORETICAL BACKGROUND

2.2.1 Organizational Code

Kenneth Arrow was the first to introduce 'code' to scholars of organization. In his influential book, *The Limits of Organization*, Arrow (1974) uses organizational code broadly to refer to "all patterns of communication and interaction within an organization – patterns that make use of conventional signals and forms which must be learned." He characterizes the organizational code as indivisible from the organizational context and irreversible from the historical, time-bound circumstances in which it accumulated. Because of its path-dependent nature, an organizational code is firm-specific – interwoven with a firm's distinct identity and culture – and becomes rigid over time (Arrow, 1974). Thus, the code is assumed to be rather inflexible, and the language that describes how a firm creates value is limited by the strategic agenda its elite decision makers set.

Organizational code has been conceptualized across several economic-based disciplines in organizational theories. Organizational economists define it as the optimal (i.e. static), firm-

[4] Examples of this influential work on routines and resources are found in: Feldman, 1995, 2000, 2003, 2016; Feldman & Pentland, 2003; Pentland & Feldman, 2005; Pentland, Feldman, & Becker, 2012; Feldman & Orlikowski, 2011; Feldman, Pentland, D'Adderio, & Lazaric, 2016

specific language and uniformly held meaning used to coordinate and filter information efficiently (Arrow, 1974; Williamson, 1975; Nickerson & Zenger, 2004). The code plays two enabling roles: it filters relevant information from a potentially overwhelming array of noisy signals, and it supports the transfer and recombination of specialized knowledge amongst members of a firm (Arrow, 1974; Håkanson, 2010; Kogut & Zander, 1992). This latter role is particularly critical. Since complex problems, by definition, involve many poorly understood, and, ex ante, unknown, interdependencies, those involved in solving them must frequently adapt to new information. Individuals that share a language, despite possessing specialized knowledge, can efficiently interface across occupational and intra-organizational boundaries on an as needed basis.

Economic-based behavioral scientists, following in the footsteps of March (1991), define it more broadly as the shared languages, beliefs, and practices that [slowly] shape and are shaped by the learning and socialization of organizational members. The fluidity of the organizational code allows for innovation through the delicate trade-off between exploration and exploitation. Thus, while the code can be updated (e.g. to create value in new ways), it is mostly assumed to accommodate the organizational beliefs about routines for processing information efficiently (Nelson & Winter, 1982; March, 1991).

Economic sociologists, influenced by population ecology and institutional theory, define the code more narrowly, as the categorical language (i.e. signals and rules of conduct) with which a firm positions its range of product offerings to preserve or violate "domain consensus" regarding its identity (Durand, Rao, & Monin, 2007). This social code determines how external stakeholders evaluate firms and influences the legitimacy of organizational forms (Polos,

Hannan, & Carroll, 2002). However, through the code, these value-creating entities have access to and the possibility of engaging with its external environment.

2.2.2 Practice Lens

Advocates of practice theory maintain that it can help organizational scholars better theorize the emergent, novel, and indeterminate nature of organizing. As a theoretical paradigm, Feldman and Orlikowski (2011) present three principles of practice theory that can help to identify the organizational code. First, relations are mutually constitutive. This means that no phenomenon can be viewed as independent of other phenomenon; everything is part of a system. Second, dualisms are rejected. Instead, relationships between elements that were treated as dichotomous are examined directly. Third, everyday (situated) actions are consequential "in producing the structural contours of social life." Practices recursively produce and reproduce the structures that constrain and enable actions.

An influential strand of practice theory maintains that situated action and dialogue is consequential, in part, because, in these fora, members of an organization test, enrich, and recreate their shared understanding of how and why they engage in the work they do (Chia & Holt, 2006; Nicolini, 2009; Schatzki, 1996, 2002; Shotter, 1993). Thus, in addition to a view of the organizational code as firm-specific, static, and uniformly held, a practice lens focuses on the relations, dynamics, and situated enactments that continually change and sustain it.

2.2.3 Organizational Language Pragmatics

If we take 'structural contours' to include the organizational code (and its implications for the capacity of organizations to adapt), an empirical approach to [answer "the what" of] practice directs our attention away from only language and idiosyncratic words (i.e. a lexicon). Instead, a code 'in action' lens looks at the deliberate and emergent, internal and external, firm-specific and localized interplay between words and action – how language is mutually constituted by its everyday communication and meaning-making.

Research on organizational language pragmatics (i.e. language 'in action') has taken, as a reference point, Wittgenstein's (1953) concept of a 'language game' and 'speech acts' (Austin, 1962; Searle, 1969). The way leaders engage in the game of language explains how they influence meaning in their organizations – how people perceive and conceive the nature of their activity, the problems they face, their sense of identity (Pondy, 1978). A speech act is what a speaker can make with words (e.g. commands, excuses, promises) and directs attention to what is represented in a code (Warglien, 2013). Therefore, the starting supposition, from which I develop theoretical hunches and look for surprises in the data, is:

> **Supposition 1.0:** *Evidence of an organizational code will be found in both its ostensive aspects (i.e. patterns of speech acts, or language games) and its performative aspects (i.e. speech acts) of language*

3.0 METHODOLOGY

3.1 RESEARCH CONTEXT AND DATA COLLECTION

3.1.1 Industry

My research context is set within the pharmaceutical industry, where value chain stages are similar, and change slowly, among 'Big Pharma' drug manufacturers. In addition, the regulatory process is long and structured. Therefore, language is likely to evolve slowly and the drug manufacturing industry is an appropriate context for studying the stable aspects of language and meaning around value creation and capture activities. Yet, there is an ever present need to adapt to and assimilate, or lead, technological change, scientific discovery, and shifts in regulatory and reimbursement regimes, so these firms must also deal with change.

3.1.2 Sample

I analyze the organizational code in one of these Big Pharma companies. Specifically, because of its long history, I chose to study MEDRx. MEDRx was a large, multinational, pharmaceutical company that had not merged with and/or acquired another large drug manufacturing company during the period of observation. In addition, during my period of study, MEDRx had four

different CEOs, which allowed me to follow the code's emergence within and across each CEO's tenure. Thus, MEDRx offers a longitudinal case to observe stability and change in organizational language.

To better understand the organizational code, I look for the dynamic interplay between language and meaning 'in action' that is unique to a firm. I employ a longitudinal case study of a single firm, first examining the external (and publicly available) communications of MEDRx, from 1985 to present. I focus on the rhetoric employed by four separate MEDRx CEOs to persuade or build support for business model innovations associated with personalized medicine – a likely source of a firm's language of value creation.

3.1.3 Archival Data

I gathered over 550 text- and video-based data points, in which MEDRx addressed diverse audience types, across a wide range of topics, and in various locations. As a separate communication event, each data point can have many different speech acts. I collected this archival data from multiple EBSCO Host databases and websites. The data include letters to shareholders (in annual reports), letters to stakeholders (in corporate responsibility reports), slides and earnings transcripts (of annual shareholder meetings, annual financial guidance and quarterly calls, from *SeekingAlpha*), industry reports (from *S&P Global Competitive Intelligence*), analyst reports (from *Factiva*), case studies (from *HBS Publishing*), speeches (e.g. at *IFPMA*[5] *Assembly* & *Cleveland Clinic Medical Innovation Summit*), external commentary (e.g. in *McKinsey & Company Biopharma Frontiers* series, *Wall Street Journal* OpEd, *Time*'s

[5] International Federation of Pharmaceutical Manufacturers & Associations (IFPMA)

Letter to the Editor, & *Forbes'* Opinion sections), panel discussions (e.g. at *Shared Value Leadership Summit)*, 'question-and-answer' sessions (e.g. at *Harvard's Voices in Leadership Series*), 'fireside chats' (e.g. at *JPMorgan/Goldman Sachs Global Healthcare Conferences* & *Sanford Bernstein Strategic Decision Conference*), media interviews (e.g. from annual *PhRMA*[6] *Meeting* & *Indiana Business Journal*), promotional messages (e.g. from *MEDRx* & *YouTube* social media platforms), books and book chapters (e.g. in *American Chemical Society*), magazine articles (e.g. in *Executive Excellence* & *Business Horizons*), journal articles (e.g. in *Nature Review* & *Drug Discovery Today*) and quotes and content from company press releases as well as news, media, trade association, and industry-specific outlets (e.g. in *Life Science Leader, PharmTech Talk, Chemical and Engineering News, Chain Drug Review, Medical Marketing & Media, DiversityInc, Working Mothers, USAToday, NY Times, IndyStar,* & *Bloomberg BusinessWeek*).

After reviewing the archival data focused primarily on shareholders, investors and analysts (i.e. letters to shareholders, panel discussions at global healthcare investment conferences, and quarterly and annual financial earnings calls), I shifted my data collection efforts toward speeches, media interviews, external commentary, and case studies. The introduction of these latter communication events opened up many new data points.

In developing process theory, longitudinal archival data should be based on the number of temporal observations and/or temporal brackets for process deconstruction (Pentland, 1999; Miles & Huberman, 1994). Thus, as opposed to theoretical exhaustion, to know if one has enough data, the number of temporal observations is the criterion. In the table below, I provide a

[6] Pharmaceutical Research and Manufacturers of America (PhRMA)

breakdown of the type and number of data sources covering two of MEDRx's distinct "eras" of organizational code, from 1990-2004 and from 2004-2017, and describe these "eras" in detail in the analysis section below. It was around 2004 when I observed a noticeable shift occurring in the organizational code from this archival data.

Table 1. Archival Data Sources and Numbers of MEDRx Communication Events

	Types of MEDRX Data Sources								
Time Period	**Case Studies**	**Letters to Shareholders**	**Speeches**	**External Commentary**	**Media Interviews**	**Conference Panels**	**Earnings Calls**	**Other***	**Total**
Prior to 2004	9	11	10	5	10	-	-	51	96
2004-2017	21	13	18	61	50	18	52	228	461
Total	30	24	28	66	60	18	52	279	557

***Note: Other includes internal press releases, quotes from news & media sources, journal articles, book/chapters, & social media messages**

3.1.4 Semi-Structured Interviews

I conducted interviews after distilling initial findings from analysis of the external discourse and developing a speculative theoretical model. The interviews allow for triangulation and a systematic analysis of variation. The majority of interviews were recorded and transcribed (~280 pages of transcriptions) and range from 25 minutes to 2.5 hours, with all of MEDRx interviews lasting an average of 1.5 hours. Immediately after each interview, I transcribed the interview and typed up detailed notes and insights from the conversation. If I conducted more than one interview with an informant, I note it in the last column of Table 2. In addition, there are 5 interviews that I did not personally conduct, but which used my standard format of interview questions. These were recorded and sent to me (with the interviewees' permission), along with the field notes, by a colleague.

In Table 2, I provide a breakdown of these interviews with details on the interviewees' highest position held within the organization, their functional area of expertise, and their tenure

in the organization. I modified each interview, case-by-case, to fit an interviewee's position and experience in the firm and, hence, the context from which he or she was able to share his or her experiences with firm-specific language (Wengraf, 2001).

Table 2. Source, Number, and Details of Semi-Structured Interviews[7]

	Level of Responsibility			# of Interviews	Details
Interviewee	**Top-Level**	**Mid-Level**	**Low-Level**	**Total**	**Highest Position/Functional Area/Tenure**
Current MEDRX Employee	-	2	1	3	Advisor/Biochemist & External Innovation/18 years Senior Director/Emerging Technology & Innovation/6 years Global Consultant/Product Planning & Marketing/5 years
Past MEDRX Employee	5	-	-	5	CEO, President, & Chairman/Drug Development/37 years Vice President/Corporate Strategy/27 years Vice President/R&D Strategy/28 years (3 interviews)
Other BigPharma Employee	1	7	1	9	Director/Strategic Data Analytics/6 years* Area Medical Director/Internal Medicine/9 years Associate Director/IT-Translational Medicine/12 years (2 interviews)* Director/Medical Outcome Specialist/14 years* Director/Portfolio & Decision Analysis/8 years (2 interviews)* PhD Fellow/Medical Devices-Engineering/26 years Global Director/Digital Solutions-Brand Management/15 years
Healthcare Industry Expert	3	1	-	4	CEO, Founder/Patient-Led Healthcare Communications/2 years Director/Precision Medicine/8 years (2 interviews) Vice President/Clinical Trial Feasibility/12 years*
Corporate Communications Expert	1	-	-	1	Chief Communications Officer/Strategic Communications/5 years
Corporate Development Expert	3	-	-	3	Director/Corporate Development/11 years (2 interviews) Chair/Business & Sustainability/1 year
Total	13	10	2	25	
					*** I did not personally conduct these interviews, but received the transcripts &/or field notes from a co-researcher and/or author**

3.2 ANALYTICAL PROCESS

3.2.1 Phase 1: Analysis of External Speech Acts

Based on the predominant conceptualization and assumptions that the organizational code is firm-specific, I first analyzed the external speech acts (summarized in Table 1), looking for words in the discourse that were not apparent in other firms' letters to shareholders. I read each

[7] See Appendix B for a general use template of the interview protocol and a set of questions I used primarily for BigPharma employees.

MEDRx communication event thoroughly and multiple times, looking for instances of firm-specific language. Then, I went back with specific concepts in mind, such as drug discovery and development, to see if firms use distinctive language when talking about their value-creating activities. I paid attention to new business concepts (e.g. open innovation and personalized medicine), to see if they showed up in the discourse, in unique ways. I believed these would bring out idiosyncratic rhetoric, justifying a firm's use of novel management techniques or business model configurations. This led me to the discovery of "tailored therapeutics" language used by MEDRx, which related to their approach to 'personalized medicine;' this language was not being used by other BigPharma companies.

Personalized Medicine Discourse. 'Personalized medicine' (now, more commonly labeled, 'precision medicine' (PM)) is a broad healthcare concept challenging the blockbuster drug approach and has the potential to alter every aspect of Big Pharma's business model. Even though PM – in the form of a targeted gene therapy – has been around for two decades, there is considerable skepticism regarding Big Pharma's ability to profit from personalized therapies, which target much smaller markets but do not necessarily cost less to develop (Milne & Zuckerman, 2011).

Because PM has potentially profound implications for a drug manufacturer's value creation and capture, I followed MEDRx's speech acts surrounding "tailored therapeutics," to better understand code development. I focused mainly on the content and the temporal variation of speech acts related to the language of personalized medicine. Yet, interpreting the evolution of meaning and language around "tailored therapeutics," within MEDRx, required a consideration of discourse at multiple and higher levels of situated context. These new observations eventually led to the abductive methodological practice of "defamiliarization," to

find surprises I had taken for granted before, by examining the layers of assumptions from earlier reading/analyses of the empirical data (Tavory & Timmermans, 2014).

Field-Level Discourse. To trace MEDRx's exploration of the PM concept and its meaning, I read science and technology journal articles related to PM and talked to four experts in the field. A 2011 report from the National Research Council (NRC) provides a detailed report of precision medicine, including the reasoning behind the Council's preference for the term "precision medicine" over "personalized medicine[8]." In addition, during his 2015 State of the Union Address, President Obama announced an initiative centered on promoting "precision medicine." Yet many people in the public and mainstream media, as well as industry practitioners and non-profit healthcare and scientific organizations, still use the two terms interchangeably (Hoffmann, 2017).

Organizational Case Studies. To better assess the origination of the language of "tailored therapeutics," I collected case studies from historical events in MEDRx history. The case studies provided insights, which allowed me to revisit observations and collect additional external communications, coming from the broader population of MEDRx organizational members.

Revisiting Organizational-Level Discourse. After reading the case studies, I linked activities and technologies that were related to MEDRx's PM assimilation efforts with how the CEO mentioned these things in their broader external communication. In addition, I familiarized myself with how MEDRx's centrally-focused biomarker strategy appeared in discourse even

[8] In interviews, several people commented on the poor reaction many had to the language of 'personalized medicine.' These comments indicate that, even though people understood the science and could relate to genomics and the potential of biomarkers, artificial intelligence, etc., they still struggled to find the right words for what it could mean in practice, especially how it might change the practice of drug discovery and treatment.

earlier and later than when the CEOs start and stop explicitly mentioning "tailored therapeutics" to key stakeholder groups, such as shareholders.

Quotes from news/media articles, internal press releases, as well as presentations at different conferences and/or speaking events, demonstrated that "tailoring" was being applied in areas such as MEDRx's newly formed diagnostics division, manufacturing (e.g. continuous flow manufacturing facilities), legal patent counsel (e.g. external venture capital funds), corporate responsibility (e.g. shared value initiatives), as well as in MEDRx's recently constructed biotech and R&D centers around the globe (e.g. Alexandria Center in NYC, MEDRx China Research & Development Center in Shanghai).

3.2.2 Phase 2: Analysis of Internal Speech Acts

Next, I analyzed the internal speech acts, which were recounted to me, retrospectively, in the interviews I conducted[9]. I used the surprises, insights, and analytical outcomes of the first phase of research to inform my initial focus in the second phase. Through interviews with experts at a local academic institution and in line with the NRC's precision medicine language recommendation, I confirmed that scientists in various healthcare fields make a clear distinction between personalized and precision medicine. This fact was reiterated in interviews with past and current MEDRx employees, who explained how the tools and knowledge surrounding how to make "precision medicine" was at the forefront for MEDRx researchers, who were "wired for science."

[9] There was a surprising amount of overlap in what the MEDRx interviewees talked about and how well the events were recounted in the same way, across the interviewees, wherever their tenure overlapped. Their perspectives and experiences with language differed, but not the factual content of their recollections.

Because I had set out to develop a more nuanced understanding of the organizational code construct and the processes by which it emerges, I needed to explore the broader organizational code of MEDRx over time. In addition, I wanted to understand the role of the organizational code, as a force for continuity as well as change. Therefore, I changed my interview guide used for current and past MEDRx employees, to focus on other organizational code content besides just "tailored therapeutics." Most of my interviewees were elite informants, with vast experience in their organizations, and able to provide rich details capturing important aspects of the organizational code's constitutive elements. Many other examples of firm-specific language came up in my interviews.

Live Coding. To analyze the interview data, I used a mutually constituted system of live coding to operate as a method for both discovery and validation (Locke, Feldman, & Golden-Biddle, 2015). As with open, axial, and selective coding, the process starts by brainstorming categorical buckets, or ideas, that the data could be an instance of. This fixes an idea "for now" (i.e. provisional fixity), that can later be unfixed and changed when observational codes are pressed against the data. Once the type of data that goes into each bucket are identified and labeled, a link is expressed to signify the meaning between the data and an idea. This linking evolves into axial and selective coding, to make relational patterns[10] more concrete (Saldana, 2009; Miles & Huberman, 1994).

Narrative Analysis. Following Pentland (1999), I analyzed the narrative structure of communication events and speech acts to build a theory of the process of code development.

[10] See Appendix C for a table of the theoretical suppositions, which includes a summary of the gaps in each theory, in terms of the theory's ability to explain the phenomena and processes I was observing. Appendix D includes a figure (color-coded to align with each theory's supposition) that models the processes I expected to emerge (even though I did not yet have the data/evidence to validate it).

This includes coding each text according to the deep structural elements (i.e. events, sequence/pattern of events, actors) and contextual elements (i.e. evaluative frame, narrative voice, strategic-, historical-, macro-, and situation-specific context), looking for the themes in each (i.e. the story). I coded and wrote field notes for each unit of observation (i.e. communication event) to document what the code could look like inside the organization and how it may be changing (or enduring). I included questions to ask of the data for additional summarizing and interpretive codes, which allowed me to further characterize the attributes of the structural narrative elements.

This coding process captured different elements of MEDRx's approach to creating and capturing value – what activities they engage in, how, and why. I was then able to identify and describe generalizable elements of a process model across different localized and situated storylines (i.e. the fabula). These insights led to the bounding of speech acts into distinctive semiotic chains and systematically analyzing variation across different kinds of speech acts (i.e. dataset variation), across instances of the same kind of speech act and instances of the same kind of speech act during the same period (i.e. intra- and inter-situational variation), and across time within a particular kind of speech act (i.e. temporal variation).

3.3 THEORY-BUILDING PROCESS

3.3.1 Phase 1: The Story of "Tailored Therapeutics"

Surprises. In the initial narrative analysis of MEDRx's external communications to key stakeholders (from speeches and letters to shareholders), several surprises emerged from the data. First, this initial analysis of external discourse turned up very few firm-specific words. The language used to describe important value creating activities and how MEDRx expected them to contribute to growth and profitability was not noticeably different from that used by other large pharmaceutical manufacturers.

Second, when I searched for mention of new business concepts, such as personalized medicine (PM) or open innovation (OI), I found no mention of them. This was surprising, given their frequent mention in industry and trade literature, where the PM language appeared in the literature around 2003, as well as MEDRx's reputation for being somewhat of a pioneer in experimenting with new processes, such as OI. The only language that stood out as being firm-specific was the phrase tailored therapeutics (TT), which appeared in CEO letters to shareholders and speeches, from 2005 to 2010.

It seems that firms engage in some sort of translation process that links external concepts with internal meaning or practice, as was the case with MEDRx's tailored therapeutics approach to personalized medicine. Possibly, firm-specific language does not often appear in external discourse; however, I felt the lack of reference to either PM or OI warranted further examination. Interviews with individuals knowledgeable about PM and articles on the science behind it helped to identify technical words that would indicate the use of a personalized approach to developing

therapies. By linking these words with the presence of tailored therapies, I traced how the application of PM evolved in the firm.

Hunches. My theoretical hunch, based on this analysis, is that the phrase I inferred, from the way in which TT was used and its eventual disappearance from external discourse, reflects a process of assimilation for the new concept of PM. TT seemed to take on different meaning during the time it appeared in the external speech acts, as compared to when it disappeared. This might indicate that it was either no longer useful, or that it had been fully integrated into thought processes and practices. Firm-specific meanings for general words (e.g. drug development and discovery) may likely be just as important as firm-specific words. In addition, because the language of tailored therapeutics was only present in letters to shareholders and speeches from 2005 to 2010, it may be the case that firm-specific language disappears as it is translated into practice.

Insights. The promise of science was more effective therapies, but the challenge was not only smaller markets, it was figuring out how to do drug discovery and development differently[11], and to serve customers (i.e. physicians and insurers with whom they did not interact directly) to enable the new approaches to be diagnosing and treating patients. It was not at all obvious how PM could or should affect the various value-creating activities, even though genomics was already part of the science of drug discovery. Firms needed a language that applied across the value chain to describe this new approach, which would enable the various activities and functions to interface effectively and efficiently, as they incorporated PM in their practices.

[11] The FDA was also trying to figure out how to best structure clinical trials aimed at subpopulations of patients with different genomic, proteomic, metabolic, etc. profiles.

Two case studies informed my interpretation of MEDRx's efforts to create new, firm-specific language. Earlier, I found that PM was discussed in external discourse, not as PM but, instead, as the specific ways in which the company was personalizing its approach to discovering, developing, manufacturing, and marketing its drugs. In the case studies[12], I found that the umbrella word that MEDRx used instead of personalized medicine – tailored therapeutics – emerged through a process of trial and error, in which the company seemed to be looking for 'use cases[13]' that would justify or validate the utilization of a particular word to capture what PM could mean to MEDRx. The term use case comes from the product development literature and the practice of entrepreneurs, who seek use cases for their novel product or service, before building a full business case for their venture. MEDRx seemed to require use cases that would demonstrate what practices would or could change and how, as the company moved to embrace PM.

TT did not just appear in MEDRx's vocabulary, and it was not dictated by the CEO. TT emerged through a process of trial and error. MEDRx's response to PM was the formation of a team, around late 2002, named "Project Resilience[14]." In May 2004, after assuming the future would involve a cost-conscious world as well as a more innovative one, Project Resilience's recommendation to pursue a "niche high value" strategy was approved by the executive team and the board of directors.

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[12] The information presented in the case study was confirmed and enriched in later interviews.

[13] I borrow the term "use case" from the product development literature and from the practice of entrepreneurs. Before building a full business case for a new technology, product, or service, entrepreneurs must find viable use cases – categories of use by an identifiable customer (well defined so the number of potential customers can be counted), that would justify building out the full business case. By describing the use case, and for whom that use is compelling, the entrepreneur begins to clarify why his or her new venture should be created.

[14] The Project Resilience team was named after Gary Hamel's article *The Quest for Resilience*.

The MEDRx marketing and sales (M&S) teams did not like "niche high value." To them, 'niche' already had a meaning – that of a small market; yet, small market wasn't exactly the meaning the strategy team wanted to convey. This language implied M&S wouldn't be selling, or making, as much anymore. To them, it was too different from the current "Blockbuster" model. MEDRx research and development (R&D) did not like it because it seemed to be "just another fad." They thought it implied too narrow of a focus (specifically, that it primarily applied within oncology). Therefore, to R&D, 'niche' did not accommodate the existing business model's entire discovery process, where the concept was being applied in areas outside of oncology. Responding to concerns that the term 'niche' was both misleading and inaccurate, the strategy was renamed "targeted therapeutics."

Yet, again, there were mixed reactions to this term for MEDRx's new strategy, that stemmed from how the word 'targeted' was understood. For example, researchers within the MEDRx Research Lab (MRL) did not like the use of this word because they felt they were already doing this. The first step in drug discovery is to identify a biological target for a molecule to act upon. There also continued to be concern among MRL employees that the term "targeting" was not a very useful approach in cases outside of oncology. Further, M&S did not like the "targeted therapeutics" initiative. They felt the company had more important problems to deal with, such as with one of MEDRx's potential blockbuster drug, which had launched in 2001 for the treatment of sepsis: "Lackluster sales were blamed on the drug's delayed launch and poor efficacy results." As one MEDRx executive recounted:

"*The company was trying to find the right language for this strategy. We needed to figure out what we were really talking about when we referred to the term 'targeting'.*"

As the Project Resilience design team (which consisted of ~10 "thoughtful" and "influential" people) grappled with these issues, they came to use the word "tailored," which could be linked to value creation in a more flexible way. The case study illustrated:

"Intense conversations inside the firm generated the insight that there were many ways in which a drug could be personalized, and that the level of tailoring of any particular drug was likely to vary significantly across the company's four therapeutic areas – neurosciences, oncology, cardiology, and endrocinology."

Thus, the firm-specific words of tailored therapeutics became part of MEDRx's code, as new use cases for TT were discovered, beyond those in M&S and R&D. In seeking the right language for the firm to embrace PM, the process MEDRx went through is akin to the process that entrepreneurs use to find use cases for new products or services. In much the same way that the technology, products, or services of the entrepreneur are tools that need use cases, so is organizational language. The words, acronyms, phrases, and visuals (WAPVs) are modular bits of language that act as tools to help the organization find the "right" meaning through use cases.

MEDRx required use cases that would demonstrate what practices would or could change and how they were to change, as the company moved to embrace personalized medicine. Each cycle of experimentation (gauging reactions to a new WAPV), generated insight into whether the new language was compelling to various members of the organization, and if it was not, why that was the case. When a word resonated, this seemed to reflect, in part, an absence of conflict between existing associations and the intended meaning of the word, and reflected the connections that could be made between the new word and practice.

The new word could be concretely linked to practice through the identification of use cases for it. The use cases constituted proof that a new word could be instrumental in engendering a desired change in what people did and how they thought about their work. Use

cases concretized why the change was reasonable, what the scope of modification to value-creating activities might be required or considered acceptable, and how the company could implement these changes. Thus, use cases helped MEDRx to make the case for *why* we're changing, *what* we're changing, and *how* we're changing, and, thereby, engaged various constituents within and outside the firm. The emergence of compelling use cases for the phrase tailored therapeutics seemed to explain why the language became a part of regular discourse and how it was assimilated as a new element of the organizational code. Figure 1 illustrates this nascent theoretical process and the idea that part of creating a use case that gets traction in the organization involves accumulating these different kinds of proof.

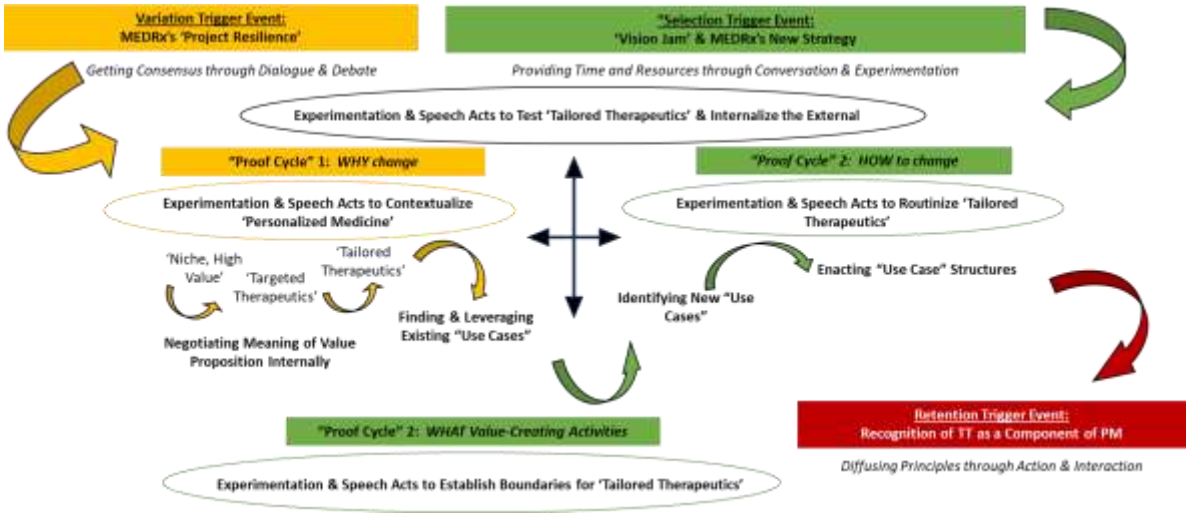

Figure 1. Use Cases and Proof Cycles - Code Emergence of Tailored Therapeutics

In Figure 2, I outline the types of use cases that were identified, generated, and leveraged across MEDRx's value chain – in drug discovery, drug development, manufacturing, marketing, and sales. Across the organization, these use cases were starting points for understanding things differently, as it related to the language of tailored therapeutics. In line with language as a categorization system, Figure 2 demonstrates a use case 'catalogue' that was generated within

MEDRx to enrich and/or refine organizational members' understanding of how personalized medicine applied to their individual work areas.

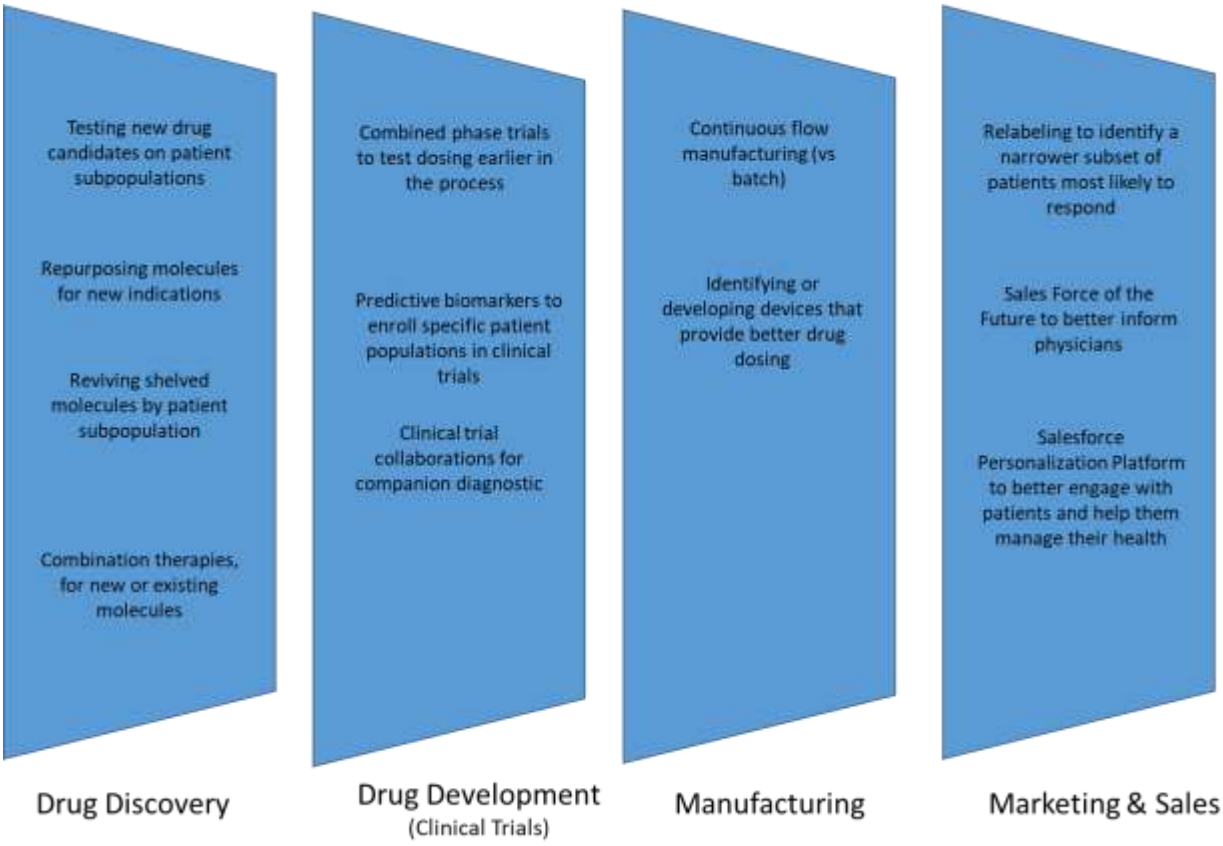

Figure 2. MEDRx Use Case Catalogue for Tailored Therapeutics

For example, in drug discovery, there were use cases to test new blood thinner drug candidates on smaller patient subpopulations who may need the drug in certain situations (e.g. patients undergoing an angioplasty who have a higher risk of major bleeding). Similarly, use cases also revolved around novel technology, such as tissue-based and neuroimaging technology, to better identify biomarkers in narrow segments of Alzheimer's patients. Use cases also involved repurposing molecules for new indications, as was the case with an erectile dysfunction drug that also proved safe and effective for treating patients with hypertension. The tailoring language also led to use cases whereby molecules that had been shelved for insignificant efficacy

results were revived by modifying dosage and/or administering to more specific patient subpopulations. In addition, drug discovery use cases for combination therapies also highlighted the value of tailored therapeutics. An example was a combination therapy, using new and existing molecules, for treatment-resistant depression that "allows physicians to tailor treatment to each patient's needs."

In drug development, MEDRx provided tailoring use cases that demonstrated value in the way they conducted clinical trials. For example, by testing hypotheses about which patients could benefit more from some of their cancer drugs, MEDRx was able to apply predictive biomarkers to enroll a smaller group of patients - who were more likely to respond – in clinical trials. As the Vice President for one of MEDRx's oncology products said, "Our vision is to change the world of cancer care. We think the best way to be doing that is through tailoring." In addition, by giving various doses of an experimental diabetes drug to patients earlier on in the process, MEDRx generated a use case for combining phase 2 and 3 clinical trials. MEDRx also generated a use case of collaborating with a company during clinical trials to use a companion diagnostic to help develop a drug for severe sepsis.

Compared to R&D and marketing and sales, manufacturing's use case for tailored therapeutics seemed to come a few years later, after they had garnered the technology, expertise, and capital resources to employ continuous processing production methods. Traditional batch methods inevitably lead to waste throughout each of the sequential steps of compressing ingredients into tablets and coating them. Then, quality control testing and other monitoring are separate operations conducted at the end of production of each batch. In continuous processing, in contrast, the individual batch steps occur continuously, as the ingredients move through the production process in assembly-line fashion and quality-control and monitoring can be fully

integrated into the operation. This use case highlighted many benefits, including reduced costs of making medicines, faster production, and greater flexibility to tailor production to demand. The latter is especially true when clinical trials are being conducted with smaller patient populations and also require variable dosing amounts. In addition, MEDRx identified a use case during a collaboration with a device company to manufacture an insulin delivery system that allows for a higher dose in half the volume for higher insulin-requiring patients with diabetes.

A use case in marketing involved relabeling and had a positive effect on making tailored therapeutics more concrete for those organizational members. For example, MEDRx asked market regulators to make their fastest-growing blockbuster lung cancer drug available to fewer patients (i.e. with the nonsquamous non-small-cell lung cancer histology), and then watched as their sales doubled. "Sales Force of the Future" was a use case that reinforced the how of tailored therapeutics for MEDRx sales teams. Now, as opposed to multiple points of contact with doctors, members of the sales force would be rewarded much more deliberately for providing physicians with the information, expertise, and service they expect, to better achieve the company's tailoring objectives. More recently, the digital transformation has lent itself to a use case in which MEDRx has employed a salesforce personalization platform to better connect and engage with patients to help manage their health. As the Chief Marketing Officer at MEDRx said,

> *"For us, the journey of change in terms of communication and connection with our customers has been pretty dramatic over the last five years. It's really a matter of us evolving from a customer-focused company to a customer-centric company…That's the journey we're on."*

Some of these use cases, triggered by tailored thinking, were not necessarily what others in the industry might call personalized medicine; tailoring is MEDRx's language used to describe what personalized medicine means to them. Thus, tailored therapeutics spawns uses

that are not strictly personalized medicine – uses that blend existing categories and ways of doing drug discovery and development, manufacturing, and sales and marketing.

In Figure 3, I provide a diagram of the patterns of speech acts related to the organizational code[15]. It captures the key elements and deep narrative structure involved in the process of code emergence, specifically around the language of tailored therapeutics. These elements include the use cases and proof cycles of speech acts. Use cases that generate recurring patterns of the organizational code – what I label the ostensive code – are the more structured narrative elements of the code. Use cases that help reject, redefine, and inspire new words and meaning of the code – what I label the performative code practices – act as more provisional elements of code narratives. These ostensive and performative aspects of the organizational code are mutually constituted in speech acts and come about through multiple proof cycles that are part of the selection process of new and old language and their associated meanings. In addition, by looking at the external context of MEDRx and talking to outside industry experts, I got a better understanding of the external influences on the organizational code's language around tailored therapeutics.

[15] See Appendix E for use case patterns and proof cycles directed toward multiple audience types. Appendix E also includes an illustration of the speech acts and use case patterns communicated to investor audiences between 2005 and 2010. These figures reflect the potential of MEDRx's organizational code to manage the internal and external, the deliberate and emergent, and the global and local dualities associated with the assimilation of a transformative business concept of "tailored therapeutics."

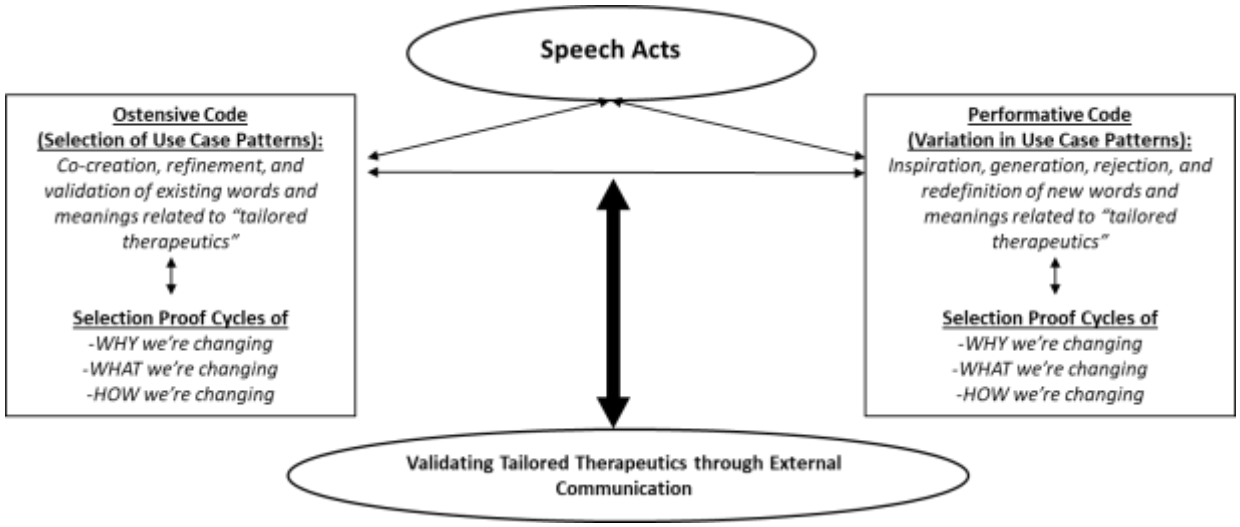

Figure 3. Patterns of Organizational Code Speech Acts

3.3.2 Phase 2: The Emergence of the Organizational Code

From Phase 1, I developed insight into the organizational code as both firm-specific language and firm-specific meaning in practice, which led me to develop the theoretical process from Figure 1. In line with a view of language as a tool, the firm had to make the case that the new language of tailored therapeutics was useful, and this occurred through an iterative process. There were a lot of speech acts suggesting that, for a newly introduced WAPV to emerge, it needed to be compelling and useful. Proof cycles constitute this process of building use cases for new language.

Thus, I learned that firm-specific language, the organizational code, can emerge through a trial and error process of finding the right words to communicate about a new business concept across value creation activities. Not only did the new words need to trigger appropriate kinds of new thinking, it needed to be similarly understood. In other words, there needed to be some

commonality in the use cases for it – across the activities in which the word would or could be used.

Tailored therapeutics, however, represents just one instance of code emergence at MEDRx. To substantiate these theoretical inferences, I needed to observe other instances of code emergence. Therefore, in Phase 2, I continue to look at speech acts (as well as their external influence) to see if I can find instances of similar types and patterns of speech acts in distinctive situations, and to capture any important differences in the speech acts or patterns thereof.

In Phase 2, I wanted to know how else firm-specific language might come about. Although tailored therapeutics was a phrase unique to MEDRx, it represented an effort to assimilate a novel, external business concept. How else might new words arise and become part of the organizational code? The existing literature indicates that new words come from the top down, e.g. as part of rolling out a new strategic initiative (Arrow, 1974). If this is the case, there may be other ways that the top-down process unfolds. In addition, I wanted to know if new words also emerge from the bottom up. Therefore, I designed a semi-structured interview guide to uncover other instances of firm-specific words and meanings, how they emerged, and how far, and by what means they diffused to other parts of the firm. I asked questions to elicit stories about how organizational members see or hear the organizational code and how they experience it.

Surprises. From these interviews, I captured internal speech acts using the words, acronyms, phrases, and/or visuals – what I label as WAPVs – that were idiosyncratic to the firm.

I discovered that 23 distinctive WAPVs came into MEDRx in a variety of ways[16], and I learned where and when the new language was created organically, within the firm, and/or imported from outside the firm. For example, WAPVs like "Seven Essentials" (7E) and "Cup & Pen" (C&P) were triggered by a goal in mind. Whereas 7E's goal came from the top-down – by a new CEO – to set a new strategic direction, C&P's goal came from managers in drug development – from the bottom up – to solve a problem at hand. Still, other WAPVs, such as "the patient is waiting," emerged spontaneously through everyday work practices:

"'Patient is waiting' was the catch phrase that got legs. But it just popped up in a meeting somewhere. You know, somebody pointed this fact out and people started to say, 'Gee, that's interesting!' and then somebody found a little poster really related to the wait times at hospitals. It showed a patient that had already decayed to a skeleton sitting in a waiting room. So that image then took that phrase and really perpetrated it throughout all of the discussions."

Other WAPVs, such as "Discovery without Walls" (DwW) and "FIPNet," were triggered by language imported from external expertise and developments in the field. The "outside-in" WAPV of DwW was imported by a new hire – an externally-engaged, deep domain expert – to fuel and/or inform his internal work, while FIPNet was creatively adapted by a MEDRx polymath, to identify and solve firm-specific opportunities and problems. Polymaths seek to change things, by reconciling the conflict between what is and what could be. Only after FIPNet was introduced, was the more common external language of FIPCo brought into the organization, to differentiate the new from the old.

Other sources of novel WAPVs include planned and unplanned events and/or associations organizational members make, through their experiences with consultants, during work events, from their personal lives, or due to other outside influences. For example,

[16] Based on non-MEDRx Pharma employees interviewed, the ways firm-specific WAPVs are introduced are similar across firms.

"e.MEDRx" language was heavily influenced by an HBR article on networks supplanting corporations, and "learning organization" came about after managers in Human Resources (HR) read Peter Senge's book, "The Fifth Discipline." In addition, "Cup and Pen" caused employees to go home and talk to their families about the new way they did work. In one such instance, an employee's high school son (who was taking a class in Latin) got creative and gave his father the Latin rendition of "Cup and Pen." The father then told this story to those he worked with. This led to subsequent words, meanings, and practices being introduced, leading to visuals of C&P "coat of arms."

In Figure 4, I summarize these different origins and triggers of WAPV variation and illustrate elements of the evolution of the organizational code. Regarding where firm-specific words come from, this diagram highlights the hunches from Phase 1 that I confirmed and extended. In addition, from these interviews, I learned more about why and how these words emerged, and why and when they disappeared.

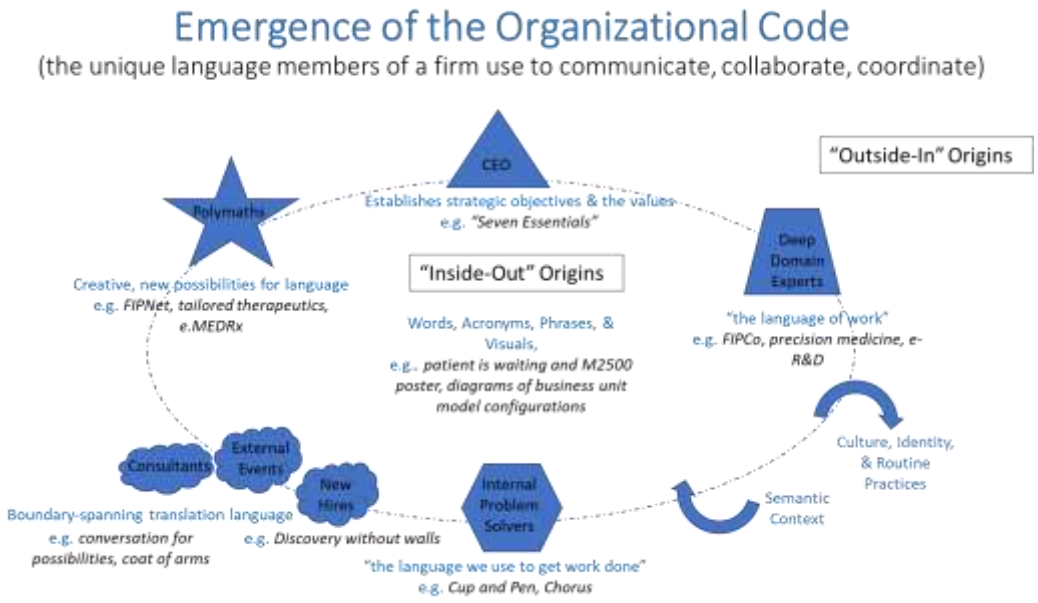

Figure 4. Sources of Unique Language in the Evolution of the Organizational Code

Hunches. Although these additional WAPVs emerged through a variety of distinctive origins, which differed from the deliberate and top-down use of Project Resilience and tailored therapeutics, I observed that the code emergence process for these WAPVs embodied the same deep structure as the process I inferred in Phase 1. For instance, although the "Cup and Pen" language was not changed through a contestation of its meaning (as was the case with MEDRx's personalized medicine language), the meaning of "Cup and Pen," in practice, was still negotiated. The C&P language caused individuals to question the reasons why they were hired, and use cases communicated what processes needed to change and how work could be done differently (and at certain times).

After reflecting upon my observations in the external discourse, seeing patterns from my more recently observed surprises, and integrating insights from each phase, I developed my next theoretical hunch – around reasons firm-specific words disappear, not only from external discourse, but also from internal discourse. I expected that these firm-specific WAPVs would disappear from conversations once they stopped provoking new thinking and once the meaning had been converted into practice.

Insights. After conducting more interviews and collecting more examples of WAPVs and their timelines, I developed additional insights into why elements of the code, firm-specific WAPVs, seem to become less prevalent in organizational discourse over time. First, I found evidence that firm-specific words were deliberately translated into general business terms for firm-wide and external consumption. Two interviewees discussed a CEO initiative that came about to "create a clear line of sight to the customer," to reduce the costs of drug development,

and to speed the time it took to get a drug to market[17]. The project team that was tasked to meet these three objectives created new [but not very unique[18]] language called "The Business Unit Model," which included visuals illustrating various organizational charts, hierarchies, and structures. From these pictures, the project team could more efficiently and effectively communicate the "why" behind the business unit reorganization. Specifically, the pictures made it easier to communicate differences between the old ways or reorganizing and the new proposed ways, and highlighted the areas that enabled a "clear line of sight," speed of decisions, necessary interfaces with other organizational units, and the level of centralization and decentralization required for each. Once this was communicated throughout the organization for a period of time, the WAPVs surrounding this initiative became less discernable, and were communicated via 'business as usual' organizational charts.

As was the case with "tailored therapeutics," other situations where firm-specific words became less visible, was when a WAPV no longer provoked new thinking. The desired change had been achieved and absorbed into practices, and, even though those practices may have continued to evolve, the shift in thinking had occurred. For instance, according to two interviewees, MEDRx employees now recognize the organizational code around "tailored therapeutics" in the templates, technical jargon, abbreviations, and/or arcane terminology used to prepare for and/or conduct clinical studies. In addition, another interviewee noted that, once the "Heavyweight Product Teams" came about, the "Cup & Pen" language was no longer needed;

[17] This business reorganization initiative – to create a "clear line of sight to the customer" – was also found in external communication within the company's annual report

[18] Although this language sounded like business as usual, it was a novel way to be organized in the pharmaceutical industry, at the time MEDRx introduced it. Akin to PM, this type of business model organization was out there, but there were few observable examples of it being assimilated into practice in this industry.

the roles of both “Cup” members and “Pen” members had been clearly defined and were understood in practice.

In addition, several firm-specific WAPVs were created as part of a process used to introduce new, external concepts to the firm, such as quality, learning organization, networks, personalized medicine, and the internet of things (IoT). To figure out how these new concepts could be useful to various parts of the organization, the firm identified use cases in speech acts. These eventually disappeared, or were used less often, as practices and/or strategic objectives changed. Oftentimes, the language from the external profession or community of practice replaced it, as was the case for much of MEDRx’s language around quality, Kaizen costing, and continuous improvement (e.g. “Performance Excellence”, “C4I,” and “Six Sigma”).

4.0 ANALYSIS

4.1 PHASE 3: THE EVOLUTION OF THE ORGANIZATIONAL CODE

From the outcomes of Phase 1, I created a structure to bound WAPV semiotic sequences of the organizational code. As it relates to patterns of use cases and the proof they are trying to generate and/or refute, I identified which speech acts were connected and how. In Phase 2, I tested if that structure was going to hold up when/if language comes into the firm through different channels. I collected additional information about WAPV origins and the process by which they emerge and disappear. Regardless of patterns of speech acts that originate in different places, this process allowed me to test the initial boundaries of the organizational code and to test whether use cases and proof cycles are, as I expect, important. Therefore, in Phase 3, I continue to push the observations against the structural elements of the process.

4.1.1 Temporal Variation

Based on analysis of the interview transcripts (i.e. field notes, memo writing, etc.), I follow the speech acts and semiotic sequences over time, to see if the structure of the process differed according to any temporally distinctive features of the environment, organizational context, or strategic imperatives. I identified three separate, yet overarching, "eras" of MEDRx's

organizational code, and one that is still emerging: “The Pill” (Pre-1990); “The Process” (1990-2004); “The Patient” (2005-2017), and; “The Problem” (2017-present).

By situating WAPVs within the broader, global semantic context, I identify the influence of a host of forces in the organizational, competitive, institutional, and macro context. These eras represent a point in time for the organization, that is understood in terms of its place in a larger ecosystem, and which creates a semantic context from within which novel WAPVs will be interpreted. The local semantic context includes the prevailing value and belief system in the organization (i.e. the most salient aspects of its strategic objectives) and shapes how WAPVs are understood. Thus, these eras differed in their strategic imperatives for value creation as well as the outcomes of code practices, whereby introducing novel language in one era would be understood differently if being introduced in another era. Although there is overlap in the WAPVs across time periods, a distinctive, [ostensive] code could be captured in each era. In Table 3, I summarize MEDRx’s strategic imperative and consequential code outcomes of each era and include quotes from different interviewees which I believe capture the code’s why, what, and how language used to get their work done.

Table 3. Summary of MEDRx Strategic Imperatives and Code Outcomes across Eras

Era	Strategic Imperative	Consequential Outcome	Interviewee Quote
The Pill Era (1970-1990)	Financially-focused - on a drug's market potential (i.e. as a blockbuster drug) --take waste and variance out of the organization to reduce costs	'Follow the template' language and practice leads to an agility mindset	*"Figuring out what to do was somewhat a function of reading tea leaves. You tended to look to your manager or your boss to figure out what to do. It had that residue of hierarchy."*
The Process Era (1990-2004)	Efficiency-focused - on how the Pharma ecosystem affects their processes --open up the company to learn new methods and improve productivity	'Speed to market' language and practice leads to a "patient is waiting" mindset	*"And the cultural change that 'Cup-Pen' brought in was, 'Wait a minute!' You challenged things. You asked questions: 'You want to what? Why do you want that? What are you going to do with that? I don't think you need it'."*
The Patient Era (2004-2017)	Network-focused - on how they can better meet needs of patients and customers --tailor drugs to align stakeholder interests and navigate the 'cliff' of upcoming patent expirations	'Patient at the center' language and practice leads to an innovation ecosystem mindset	*"If you're really patient focused, I mean why not do everything possible to try to find that patient the right medicine, at the right dose, at the right time...I think that the idea of tailoring is pretty well embedded in the way in which we develop our medicines today...It's kind of become everybody's job is if you if you know what I mean."*
The Problem Era (2017-Present)	Problem-focused - on the most "compelling and transformative" drug therapy modalities --find scientific solutions to address patients' unmet needs	'Pursuing innovation' language and practice	*"So part of our remit is the new modalities, to drug the undruggable. And to get to those, because again, no more low hanging fruit, how are we going to get into the thick of the weeds up there and try to find different methods to get to it? So the new modalities will help us."*

The Pill Era (Pre-1990): "Follow the Leader." During this era, the what, how, and why of value creation and capture centered around "the pill." Enabled by discoveries in the chemical industry, the pharmaceutical industry that we know today emerged. The same CEO, who had a background in finance, led MEDRx for 19 years, from 1972 to 1991. According to interviews with two past MEDRx executives (both hired in the 1970s with +/-30 years in the company), the organizational code language during this era, can be captured by a "follow the leader" mindset:

"There is a way that this gets done. I would guess all pharmaceutical companies did it the same. History was sacrosanct…It was that we had this way of doing things that was so inculcated that no one ever challenged it. And it went on and on and on…"

Throughout this era, MEDRx was "more financially focused" and their business model was heavily tied to finding the next blockbuster drug 'cash cow.' MEDRx was a hierarchical, yet "friendly" company, with a clear top-down chain of command – a residual effect from being

a family company for so long (i.e. the previous 100 years). The *why* of the code's language was because someone told them to do it, and the *what, how,* and *when* was based on the checklist, or template, given to them to accomplish their work. According to one former MEDRx employee, "Figuring out what to do was a function of reading tea leaves."

Another aspect of the organizational code that related to employees figuring out why, what, and how they did their work stemmed from the "Japanese kicking our butts in the automotive industry" in the 1970s and early 80s:

> "*Everybody was trying to figure out what they did. We had all these words about quality. We had quality teams. We had quality this, we had quality that. Everyone wanted the Malcolm Baldrige Quality Award*[19]*. We've had a lot of things that really came to industry-wide commercial U.S as a result of [Japanese auto industry]."*

Therefore, a Total Quality Management (TQM) approach captured a significant aspect of the best practices template that MEDRx employees followed to get their work done. Further, according to the outsider CEO who came to the company in 1993, MEDRx "seemed more like a holding company…with no unified sense of mission[20]." They had acquired several business divisions that were peripheral to drug development. Other than the language of quality, there did not appear to be much firm-specific language that delineated the 'how we create value' and that would have unified people's thinking about their work throughout the firm. The *how* of the code's language – how we bring value to customers – was driven by the uncertainty surrounding who their customers were.

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[19] An award established by the U.S. Congress in 1987 to raise awareness of quality management and recognize U.S. companies that have implemented successful quality management systems. Awards can be given annually in six categories: manufacturing, service, small business, education, healthcare and nonprofit. The award is named after the late Secretary of Commerce Malcolm Baldrige, a proponent of quality management. The U.S. Commerce Department's National Institute of Standards and Technology manages the award, and ASQ administers it.

[20] Although I did not interview this MEDRx CEO, I was able to get his perspective by reading the leadership book he wrote and had published after his time in the company.

Additionally, it is important to note an event that was surfacing during this period (which I learned about from an interview). At the end of this period, in the late 80s, the Church of Scientology was launching attacks against the fields of psychology and psychiatry. Many of these attacks were specifically aimed at MEDRx's anti-depressant drug, which was launched around 1989. This event led to a response and shift in mentality, which provided MEDRx an anchor for leading change and assessing performance.

The Process Era (1990-2004): "Speed to Market." During this era, the what, how, and why of value creation and capture centered around "the process." Scientific discoveries enabled drugs to be discovered in new ways, which led to a reexamination of MEDRx's processes. In 1991, MEDRx hired a new CEO, a 32-year company veteran from the commercial side of the business, who wanted to "change things around and open the company up." However, with this transition, the previous [20-year and financially-focused] CEO moved to become MEDRx's new Chairman of the Board. Because the old CEO was hanging around as the Chairman, this is likely why the new CEO was ousted by the board of directors, after only a short 18-month run at the helm. Yet, according to one former MEDRx employee, this short-term CEO had "set MEDRx on an irreversible course."

In addition, and related to the previous era's attacks from the Church of Scientology (CSI), senior MEDRx executives decided to fight back against the claims – which were coming from ads, talk shows and interviews of CSI zealots – that MEDRx's anti-depressant drug was causing mass suicides/deaths of people. According to a former MEDRx employee, this marked a turning point for the company – it "emboldened the company and those inside to speak up and challenge things." It triggered a shift in the mentality of the organization – from being a follower to leading change and best practices.

After the decision was made to oust the previous CEO, the Board of Directors elected a fellow board member, with a business background from the telecommunications industry, to be CEO. This CEO served from 1993-1998, before another business CEO – a long-time MEDRx insider who came up through the ranks on the commercialization side – was elected and served from 1998-2008. The new CEO picked up where the ousted CEO left off; he "dusted off the company's values," divested or spun-off its businesses in the medical device and diagnostics division, and initiated firm-wide discussion ("endless debates and arguments") regarding who were MEDRx's customers.

This allowed MEDRx to refine its language around the why, what, and how of activities related to value creation and capture, and to update their drug development model. According to interviews (again, with past MEDRx executives), a "speed to market" mindset, which largely focused on how best to quickly get a drug to market, describes this era:

"You challenged things. You asked questions…Then we could completely alter the economics of drug development. We can speed it up. We could apply resources in an entirely different way. We could make up, we actually learned we can make up for the time lost in not having done that, you know, 12 months, 36 months too early, because we had more resources available to do it rapidly when the time came…"

The Patient Era (2005-2017): "Patient at the Center." During this era, the what, how, and why of value creation and capture centered around "the patient." Process changes, as well as further scientific discoveries led to a continued, yet strengthened, "patient-focused" organizational code, where a "clear line of sight to the customer" was the objective. As was the case in previous eras, MEDRx continued to emphasize the importance of managing costs and investing in R&D, to make drugs faster to meet patients' unmet needs.

MEDRx also continued to implement a strong internal CEO succession plan. In 2008, the CEO reins were handed to a CEO who came from a science background and was a 31-year

company veteran who started out as a chemist. This was the first time in a long time that a CEO with a science background was at the helm of MEDRx[21]. Being a "fast mover" in the leadership ranks, this CEO played a very influential role in the initiatives from the previous era. During his tenure, from 2008-2016, he brought the company's long 140+ year history and values – Integrity, Excellence, and Respect for People – to the forefront. When asked about his greatest impact on the company, he reflected that his ability to get MEDRx through the "Years YZ" patent expiration cliff (from four blockbuster drugs) and continually communicating a clear and consistent message and plan throughout his tenure, to all stakeholders, enabled the company to emerge from this period in a stronger position and with the company's values intact.

Throughout the era (and likely as a carryover from the previous era's "PiW" WAPV), the organizational code can be captured by a "patient at the center" mindset, which influenced the why, what, and how of MEDRx's WAPVs. This type of "patient-centric" language was in a lot of the external communication during this time. I also tried to capture it in the quote from an interview with a past MEDRx employee (who retired in 2005):

"When we start to create a world in which we network together organizations that have highly specialized skills…, well there's going to be some specificity that's related to the drug, there's going to be tailoring…But one of the things that a lot (not all) have in common will be this notion that 'I can make a contribution now…[and, here,] I think people are motivated by watching a drug move closer to patient."

In 2016, a new CEO was selected (again from within the company), whose background and experience came from the commercialization side. According to an interview with a current MEDRx senior director, the "scientist CEO" put a lot of effort, initiatives, and pride in highlighting MEDRx's internal scientific capabilities, whereas the current "business CEO"

[21] The company's founder was a pharmaceutical chemist who was determined to build a company that "would be based on the best science of the day."

seemed to believe that, to be successful at innovation would require MEDRx to do more in harnessing others' ideas and innovations (i.e. external to the organization). When asked how the company's more recent language, related to "next generation R&D," influenced the way work gets done in the company, she explained:

"With the new president, things have definitely…He actually made certain categories to speed things up. So not only did the [next generation] *rhetoric help* [but] *they started changing the infrastructure of the organization so that things could move faster."*

The Problem Era (2018-Present): "Pursuing Innovation." The larger semantic context within which WAPVs are interpreted, negotiated, and understood follows a life cycle[22] process – from "The Pill" to "The Process" to "The Patient." Although I do not have sufficient data to make conclusions about the essence of MEDRx's current organizational code (as of 2018), I am able to capture what its future evolution could entail – a focus around "The Problem."

There is evidence (e.g. a newly-elected MEDRx CEO in 2016, comments captured in interviews with current MEDRx employees, and new WAPVs in recent MEDRx communication events) that the organizational code is shifting. To keep up with further scientific discoveries and address patients' unmet medical needs, the company must solve larger "wicked" problems, oftentimes with hidden information (Hesterly & Zenger, 2014; Camillus, 2008). These includes highly complex problems for which the relevant expertise cannot be fully known in advance, and whose boundaries, form, and success criteria are continually reshaped by a diverse array of stakeholders.

[22] Life cycle is a term used in systems engineering, information systems, and software engineering to describe a process for planning, creating, testing, and deploying an information system. I use it to describe the pattern product markets and industries typically follow – of figuring out a new product, then improving the processes to deliver it, then differentiating themselves by their focus on certain customers, etc.

Science continues to expand knowledge about new modalities[23] that can be used to create more precise therapies for patients (e.g. gene, cell, and RNA therapies). As this understanding has grown, MEDRx has introduced new WAPVs in an effort to help employees think about what work they do, how the work they do could change, and why it should change. For example, the phrase "drugging the undruggable" is shifting how MEDRx decides what kind of value-creating activities to do internally and which ones to do externally. They are experimenting with emerging innovation surrounding new modalities through external partnerships and venture capital funds. This creates a source of tension because it challenges and/or questions their current core competency in the small and large molecule modalities; yet it also builds on a source of continuity – the "patient at the center" mindset that was established in the prior era.

In addition, industry-wide productivity problems continue to pressure MEDRx to "make things move faster." This has led to the introduction of additional WAPVs for stimulating new thinking about how to do things faster, such as "next generation R&D," and is shifting the why of MEDRx's drug development processes. Instead of focusing a lot of their external efforts on encouraging and fostering an "innovation ecosystem," MEDRx seems to be directing more of their efforts internally and focusing on their role in reducing the time it takes to get innovative medicines to patients. This WAPV seems to capitalize on MEDRx's "wired for science" identity – a company with a long, proud, and independent history of making it "better and better" for patients – and could potentially ease the tensions stemming from the need to venture out into new modalities.

[23] A modality is the way or mode in which something exists or is done. I use it to mean different methods of therapy, intervention, treatment, and care provided to improve a situation (to include medical procedures or applications that are intended to relieve illness or injury).

Finally, the digital revolution has brought with it a new concept – "Beyond the Pill" – that has the potential to disrupt the pharmaceutical industry. In response, MEDRx is shifting the how of their organizational code. Not only are they differentiating aspects of their "next generation" model (to include development, research, and external innovation), they are also relating it to their earlier "tailored therapeutics" initiative as well as their "innovation ecosystem" campaign. For example, MEDRx recently introduced a new initiative called "Connected Diabetes Ecosystem," which is an integrated solution to help patients "get the right dose at the right time based on each patient's individual needs."

4.1.2 Dataset Variation

Based on my analysis of WAPVs over time, I had a theoretical hunch that the global semantic context in each era was influencing [differently] the selective filters on language and meaning-making processes. This, in turn, affected the salience and resonance of new WAPVs and their emergence. I needed to identify and examine the WAPVs within and across each era, to see if the process of generating proof through compelling use cases holds over time and across different CEOs. Therefore, I looked at the conditions under which a firm-specific WAPV emerged and how this came into shared language and meaning across the firm.

Although there were quite a few different types of loci, I break down the origin of WAPVs into those that were deliberate versus emergent and top down versus bottom-up. In addition, I identify whether situations are different if the reason for WAPVs come from the outside-in, from inside the company, or are projected inside-out to the external environment.

I started to see more instances of how a WAPV evolves and takes different forms, not just trial and error, to achieve consensus. Sometimes, a word or visual stuck the first time, and then variants of it were used in many different kinds of speech acts, like "Cup & Pen." Sometimes, the initial word was vague, but gained increasing definition through alternative or derivate words, or for different use cases that fleshed out the initial idea for a WAPV, like "Seven Essentials." There were many examples of firm-specific language with origins outside the firm. For example, one MEDRx leadership program used rules similar to General Electric's highly touted "GE workouts," and was built around the question, *"What is going on in Silicon Valley and are we missing something fundamental?"*

I learned more about why unique language is created – to change thinking – as well as why it disappears – because it is assimilated into practice and must be translated for internal and external consumption. I also developed a better understanding for where new aspects of the code come from, where they live, and when they seem to fade out of use. For example, "the patient is waiting," and "learning organization" – WAPVs used to "hold people hostage" or accountable to the intent of the new language – had shorter shelf lives in the organization. In contrast, WAPVs that centered around the what and how language of an organizational code endured longer. In these cases, support for these WAPVs came from senior executives stating their importance in achieving strategic objectives. Examples included "tailored therapeutics," "FIPNet," and "e.MEDRx." One interviewee (himself, the CEO for 8 years) describes how he became disenchanted with slogans and code words, because some people in the organization used them to hide behind or protect themselves:

"If someone said they were doing 'tailored therapeutics,' it would be like, 'Well, you're good then!' or 'Oh my gosh! FIPNet? Really?' They were pure abstractions…but how do you build core concepts into that particular drug?"

While these WAPVs had already "passed" the test, in terms of their salience and resonance within the organization, they were often so abstracted they masked the WAPV's true intent. Yet, another interviewee (himself, an implementer of corporate strategy for 18 years) described how sometimes, language was used to "slow walk" an initiative, by arguing around the language. Even though employees may have agreed and/or understood the concept behind the language, they feigned confusion with a particular WAPV, to postpone the change it was trying to bring about.

To better illustrate why and how the organizational code evolves and yet simultaneously endures, I summarize specific enactments of speech acts that seemed to shift aspects of the code related to the what, how, and why language of value creation and capture. These firm-specific WAPVs, revealed through my interviews, are described in Table 4, along with my insights pertaining to their origins and the consequential outcomes for the organizational code. This table of WAPVs captures the language that comprised the MEDRx organizational code, at various points in time.

Table 4. New WAPVs in MEDRx's Organizational Code

Code WAPV	Origin	Quote	Code Consequences
"Quality" (Q-Series) – Started in the 70s and 80s and involved a series of words that were used as adjectives to describe the level the company wanted to achieve across the board	Deliberate, outside-in	*"It felt like if you didn't embrace some of that code within your company then you weren't, you know, you would not be the next picture in Harvard Business Review and so, a lot of that happened during a particularly strong 'Follow the Leader' period."* *"A pen-like mentality [that] always worried about what was going to happen when this [drug] got on the marketplace."*	In line with the notion that this was "imported" and "imposed" language, quality language involved another template to follow to get work done and to establish a base of acceptable standards in developing a blockbuster drug. The Q-Series trend is likely what allowed for the rapid uptake and success of SixSigma initiatives (starting around 2004); however, this template approach to drug development is also likely what contributed to a lot of the frustration that was evident in the following era's "Cup & Pen" language (starting around 1990), between the interdependent and tightly linked stages of development.
"**Seven Essentials" (7E**) – In a broad sense, it was a very deliberate message/choosing of words from the chairman/CEO at the time, outlining ways to improve efficiency, raise portfolio output and better serve all stakeholders including patients.	Deliberate, top-down	"[CEO] *wanted something that was organized, orchestrated, that we would return to over again that he could use in both internal and external speeches*."	As opposed to the [blindly] "follow the template" mindset, 7E was an attempt to change the way MEDRx thought about how it was going to create and capture value. Even thought it was a list of what the company needed to get right to succeed, there was more flexibility given to figuring out how the company would go about it.
"Cup and Pen" (CP) – A phrase that was contextualized in a single event (with a visual story behind it) and was continually retold, translated, applied, and understood in many different ways. It conveyed the many things MEDRx did that was wasting time and resources because they did them so early in the process	Emergent, bottom-up	*"[C&P] did more to change the way work got done than* [and]*…got people immediately into action."*	CP shifted the organization's attention toward being more mindful of why, and especially when, MEDRx did certain activities. The priority was in fixing drug discovery first and foremost.
"Speed to Market" (StM) – One of the "7 Essentials" that subsequent CEO took and	Deliberate, top-down	*"[In StM, we] looked for opportunities to shorten getting a drug to market."*	StM shifted the focus of what MEDRx needed to do, from "one more piece of

blew it out into a full-blown initiative tasked to examine the process used to make project and portfolio management decisions			science" to getting the "portfolio sharp, tight, minimalized, and resource-conserving"
"Discovery without Walls" (DwW) – Started out after a new hire for the SVP of Science & Technology; "leaders in discoveries bailiwick" to speed the process of discovery	Emergent, outside-in	*"Not quite open innovation [language] because, you know, there was still a very closed shop mentality in those, in those late 90s, but there was also a strong business development unit. And so it might have been to engage them in the development of projects that had been licensed."*	DwW shifted the how of value creation to include external partnerships, thereby encouraging a spirit of collaboration to augment MEDRx's own internal science.
"MEDRx 2500" (M2500) – A "speed to market" objective that "got legs" because of MEDRx's proximity to the Indianapolis 500	Deliberate, outside-in	*"We needed to estimate what the time would be if we were to go faster to the market. How much faster? Were we going half the time? Or would we go a tenth of the time. We're going to try to shave 10% off of our current times. So the 2500 seemed like a good number. And then it just resonated with the local culture."*	Because of MEDRx's proximity to the Indy 500, M2500 became a contextualized, meaningful, and concrete target for how they could quantify and achieve StM. It also helped MEDRx scientists shift their "naval-gazing" focus outward.
"Heavyweight Product Teams" (HPT) – A structural change implemented to offset some of the tensions created from the overarching and tightly-linked BigPharma architecture of value chain stages. HPTs were an attempt to create a more "biotech-ish" intimate structure with a tighter focus	Deliberate, top-down	"*If we had an osteoporosis therapy, we wanted everybody [on the HPT] to say, 'I'm here to cure osteoporosis' and not 'I'm here to do nuclear magnetic resonance.'"*	Shifted the language to what value creating activities were required for a particular therapy, as opposed to everyone trying to push their own agenda or technical functionality, or their own geographic market, or therapeutic area.
"the Patient is Waiting" (PiW) – A catch phrase and poster that related to the wait times at hospitals, highlighting another reason (beyond reduced costs) why "speed to market" was important	Emergent, bottom-up	"[*The Poster] showed a patient that had already decayed to a skeleton sitting in a waiting room*."	While L2500 related to the focus on speed of StM, the PiW phrase emphasized the human element of what they do and why they do it; the visual image further helped people relate to the importance of speeding up the process of getting drugs to market and became more accessible across organizational boundaries
"Gravity" & "Escape Velocity" (G/EV) – A metaphor used to describe the different forces acting against the organization as they	Emergent, bottom-up	*"Gravity resists your effort to escape the corporation and find new assets elsewhere and after you've escaped and*	G/EV shifted how MEDRx expanded their search for molecules. "Sourcing innovation" was pursued through multiple

worked toward DwW, including the Not-Invented-Here (NIH) syndrome among MEDRx members who took pride in and linked their identity as a scientist with being able to discover targets, molecules, drugs, etc. on their own.		*found them, it causes you, upon re-entry, to burst into flames and die."*	avenues via different structural units.
"FIPCo" – An acronym that stands for 'Fully Integrated Pharmaceutical Company' and came from outside the company to differentiate Pharma from biotech	Deliberate, outside-in	"*Who are all these other pharma companies out there that aren't like us? Well, we're a FIPCo, they're not."*	FIPCo provided a shorthand for what MEDRx does - discover, develop, manufacture, market, and sell – to deliver and realize value.
"The Learning Organization" (LO) – a common business phrase that came from the outside business literature, and, while not talking directly to organizational transformation, got used a lot inside the organization.	Emergent, outside-in	"*When somebody would say something and someone else would frankly want to put them in their place, by saying 'Is that consistent with…' or 'Are you forgetting the patient is waiting? These became little bludgeons that can be used because there was enough shared understanding that if you said it, everyone in the room would nod their heads and go, 'Oh yeah, you forgot the patient was waiting' or 'You forgot we are supposed to be a learning organization.'"*	Allowed organizational members to hold each other accountable for how work was to be accomplished
"Teaching Elephants to Dance" (TE2D) – A phrase from a popular book that was brought in by a CEO to help himself and others communicate what would be required for DwW to take hold – breaking down the "not-invented-here" syndrome of MEDRx scientists. It was used in place of the more common and, likely, overused 'agile' word.	Deliberate, outside-in	TE2D was in reference to the book, "*Who says elephants can't dance?"* which recounted Lou Gerstner's 9 years as CEO at IBM	TE2D inspired organizational members to keep "moving on" – become "solution finders" – and to believe it was possible to change how they did their work to create value in new ways
"Already Always Listening" (AAL) – A phrase that was suggested by a specialized consulting firm to rename the more loaded and negative terms for "bias" and "prejudice."	Deliberate, outside-in	*"[AAL is when] you're just conditioned to hear what you expected to hear but that's not what I'm saying."*	AAL represented a shift in mindset; made people more attune to the difficulties in thinking about, learning, and communicating new ways of doing things.
"Conversation for Possibilities" (C4P) – Another phrase used in training sessions to	Deliberate, outside-in	"*Conversation for possibilities' became a way of saying, 'No. Quit thinking this*	C4P was associated with a shift in the recognition that there is a particular time

explain how work in organizations should be accomplished, so as not to conflate the dialogue and make meetings unproductive. Once it was made aware to them, there was general agreement that work is done in a series of layers that should not be comingled; they should be accomplished in as separation conversations - for possibilities, for choices, and then for action.		*is a choice meeting. We don't know what direction we want to go. We will go out afterward and analyze the possibilities but we want this to be a conversation for those possibilities."*	and place for different discussions related to the stages of brainstorming, decision-making, and executing value creating/capturing activities.
"**e.MEDRx" –** MEDRx's variation of the popular 'e-business' term that was used to conceptualize notions of open innovation models that had been percolating inside the organization	Top-down, outside-in	"*Internet capabilities enabled us to think even more radically than the 'Cup and Pen' days had allowed*."	Redefined the way work was and could be done
"Chorus" (C) – A word that was introduced musically (and creatively) by one individual to define two different business entities, as bass and alto	Emergent, bottom-up	"*[Chorus was] an alternative division with an alternative mode of doing development."*	Offered a more flexible way (from the current structural approach of drug discovery and development) for the company to balance ad hoc expertise with very deep expertise.
"SWRTs" – An acronym that stood for "small white round tablets" to explain the "designer dress" mentality of determining a medicine's color and capsule.	Emergent, bottom-up	"*Every time we brought our product to Japan, they wanted it reformulated. And finally, we took the time to find out. While medicine in the U.S. was taking on colorful forms…the Japanese would reject them all. They like like this was not medicine. And so, you know, we started saying "SWRTs", and, you know, we're just gonna talk about this unless its "SWRTs".*	Shifted the attention of teams in development and marketing/sales on what activities are value-creating and, especially where, – in what markets – they should be pursued.
"Business Unit Model" (BUM) – The visual diagrams around a new company reorganization effort to create business units; used to build language around how the new organizational structures would meet the CEO's objectives of clear line of sight to the customer, reduce costs, and increase speed of decision making.	Deliberate, top-down	*"For organizational models, the pictures were very, very important to us when we reorganized…There was a lot of language created around that that probably has all fallen away now. But that was describing really new organizational constructs that didn't exist before around business unit structures. And we were able to draw*	BUM offered different words and visuals to represent past and current organizational structures that were more functionally aligned and centralized to better describe how the organization needed to be aligned in order to "create a clear line of sight to the customer." In particular, it separated drug discovery from drug development, shifting responsibility from Phase 2 to sales and

		them in really simple pictures, for people to get, you know, we did this before, now we're doing this. And here's the name of this. So actually, the language allowed us to get rid of the picture first because you would have that image burned into your brain."	marketing efforts under new business units.
"Resilience" (R) – Initially, the Project Resilience initiative broadly sought buy-in for the concept of personalized medicine but became a word that MEDRx used to bridge across the different marketing and drug discovery and development domains	Deliberate, outside-in	"*Resilience would mean something a little different in each domain. Resilience in the marketplace might mean the ability of MEDRx to be adaptive. Uhh…to find ways in which to focus and target sales so that the right patient populations would be engaged. Resilience in R&D meant the way that they recruited for clinical trials would be focused and different."*	Allowed for a coherent understanding of where the company was headed yet localized understanding of what that would mean and what it would require each part of the organization to change
"Tailored Therapeutics" (TT) – An analogy that came about as a result of the Project Resilience initiative and the negotiated meanings that were taking place throughout the organization, over the concept of personalized medicine.	Deliberate-top-down	"*It was a recognition that personalized medicine, obviously is a patient-centric concept…that would then translate into certain advantages in the drug development process." "A traditional tailor can sew up some cuffs, extend the sleeves, or even – on very rare occasions – take in the waist. In that same spirit, tailored therapeutics can narrow the target population of patients, tighten up dosing guidance based on various criteria, address the timing of therapy, or provide better information to patients – for example, to improve adherence. And, of course, none of these scenarios is mutually exclusive."*	Focused attention on what part of the patient's value-creation process you could contribute to, whether that be in identifying the right drug, the right dose, the right timing, the right info, and/or the right patient.
"FIPNet" – An acronym that stands for 'Fully Integrated Pharmaceutical Network' and related to building a network of research capabilities "inside and outside our own	Emergent, outside-in	*"[FIPNET was] usurped [from FIPCo] inside MEDRx [to start] talking about a different way that you could approach organizing and a different way you*	A narrowing of the what value-creating activities MEDRx should be pursuing and an emphasis on the how MEDRx could integrate these activities across the network.

walls"		*could approach 'discovery without walls', and everything then became a subset of FIPNet."*	
"Innovation Ecosystem" (TT) – A metaphor that helped describe the "atmosphere, nutrients, and seeds" required in a Pharma Company's environment, in order for innovation to flourish to address patients' unmet medical needs.	Emergent, inside-out	"*So the ecosystem is just everything. Because we don't want to be enclosed and this is only us. It's like the ecosystem is innovation, so innovation is in academia, is in the incubators, is in the small biotechs, ya know. We can't enclose ourselves to only drug discovery internally, because there's such a rich environment out there. Are we missing out on something…"*	Helped employees understand that meeting patient needs will require collective efforts across the board. To "speed things up," they should focus on looking (both internally and externally) for "compelling and transformative science."
"Next Generation Development" (NGD) – a model that was launched to accelerate pipeline progress	Deliberate, top-down	*"Since we've launched NGD, we've cut about a year off the actual time from first human dose to a patient in the market, and we'll further reduce this time to compete and win in our therapeutic areas."*	Became part of three interlocking R&D initiatives to "accelerate progress for patients"

4.1.3 Inter-Situational Variation

Based on my Phase 3 analysis of temporal variation, I identified three (potentially, four) MEDRx eras – The Pill, The Process, The Patient, and The Problem. And, based on my analysis of dataset variation, I identified a few important WAPVs – "Cup & Pen" (C&P), "Seven Essentials" (7E), and "Discovery without Walls" (DwW) – that seemed to trigger subsequent shifts in language, meaning, thinking, and practice. To understand how to string these WAPVs together and to determine if there was one, or many, change processes at work, I went back to the literature[24] (e.g. Van de Ven & Poole, 1995). My theoretical hunches led me to focus on evolutionary processes to see how a managed change process would unfold, as compared to how a more emergent WAPV might undergo mutation, spawn variants, and eventually homogenize.

To analyze the organizational code's change process, I first needed to identify the semiotic sequences of 'like' WAPVs, to see if there were any differences in the evolutionary process for a firm-specific WAPV that originated top-down versus bottom-up, for example. To more tightly bound the organizational code construct and its emergence, I analyzed inter-situational (and intra-temporal) variation, starting within "The Process" era. Focusing on this era allowed me to see how certain elements, of the previous "Pill" era's code, were carried forward and evolved, while others were discarded and/or significantly changed. In addition, by having a richer understanding of MEDRx's organizational code from "Process" era, I could more readily identify points of code convergence and divergence in following the use of WAPVs into the

[24] Refer back to Appendix D for the figure summarizing the change and evolutionary processes related to the organizational code, based on my set of theoretical suppositions.

"Patient" era. By identifying evolutionary patterns of variation, selection, and retention in organizational code WAPVs, I observed three distinct semiotic sequences that differed in origins but followed the same process of finding use cases and generating proof:

→ "Cup & Pen"→"Coat of Arms"→"Cupping it"→"Pen is just a box of shit without a cup in it" → "Heavyweight Product Teams" → "The Business Unit Model"→"Next Generation R&D"

→ "Seven Essentials"→"Speed to Market"→"MEDRx 2500"→"the Patient is Waiting"→ "Project Resilience" → "Tailored Therapeutics" → "Drugging the Undruggable"

→ "Discovery without Walls" →"Chorus"→"Sourcing Innovation Business Unit" → "Pharma Ecosystem"→ e.MEDRx"→ "FIPNet"→ "Innovation Ecosystem" → "Connected Diabetes Ecosystem"

Variation. Variation identifies where and when new language is created organically within the firm and/or imported from outside the firm. Thus, I first identified the three WAPVs, distinguished by their origins – top-down, bottom-up, and outside-in – that seemed to be the primary source of variation for different types of speech acts in MEDRx's existing organizational code: "Cup & Pen" (C&P), "Seven Essentials" (7E), and "Discovery without Walls" (DwW). These three situations – as instances of inter-situational WAPV variation – encompass emergent spontaneous recombination, deliberate design, and the influence of external hires. In addition, their variation ends (and, subsequently, evolves through a selection process of use cases and proof cycles) when there is a positive response to the WAPV and it is carried beyond the origination context.

Because I use narrative analysis to understand what constitutes the code and the process(es) through which it is remade, I found it useful to first code each of these speech acts as a story, according to its plot (defined by the intention and consequence of the speech act), key actors (i.e. the protagonist whose speech act produced the original WAPV, any likely

antagonists, and other actors present), voice (i.e. the protagonist's situated role and relationship to/with audience), evaluative frame (i.e. the protagonist's performative agenda and/or assessment criteria), context (e.g. situational/macro factors, historical/current values, strategic objectives, etc.) and other indicators of content (i.e. current role of the interviewee at the time of the WAPV). I highlight aspects of the previous "Pill" era's code (e.g. in "Company Culture") that may have influenced its origination. In Tables 5, 6, and 7, I outline the "story" of how each of these variation-generating WAPVs came about, focusing primarily on their origins, intent, and consequentiality, in order to compare 'like' WAPV sequences.

Table 5. The Emergent, Bottom-Up "Cup and Pen" Story

PLOT:	*Intentionality:* C&P – a seemingly random phrase and visual demonstration (contextualized in a single event) – occurred out of frustration with the fact that so many later stage processes were being done too early in the process (just to get thrown out when the drug never materialized); thus, C&P was a solution to save some of that wasted time and resources. *Consequentiality:* C&P shifted the organization's attention toward being more mindful of why, and especially when, MEDRx did certain activities, with a priority toward fixing drug discovery first and foremost.
ACTORS:	*Protagonist*: A director at the time, dramatically grabs his coffee cup and pen in front of him, and makes the point that there were some things/processes they didn't need to know or do until they had an actual drug in hand – "*Whatever I learn in making this [cup] doesn't teach me a damn thing about making this [pen]."* *Antagonist:* The Chief Marketing Officer whose "special event" – of spinning the "[color] wheel of fortune" to pick the "two sides of a capsule" – was previously used to unofficially declare a "potential new drug" *Others*: Other directors in drug development, to include the director's boss and an interviewee (as narrator)
VOICE:	A director, speaking to fellow colleagues, looking to shift the mindsets of employees – from timing their work by asking, "do we have a molecule out of research?" to "is this a molecule that can be a drug?" – in ways that would speed the process of doing drug development
EVALUATIVE FRAME:	No one should be celebrating and "breaking a champagne bottle over the bow of the ship" until the appropriate "scientific decisions" were made to show a drug has an 80% probability (vs. 20%) of success – a positive product decision (PDD) – "[Need to] *realize that when 90% of your drugs fail, we were going through the effort to do a lot of things. Some as silly as picking the 'product dress'. Some less silly, like getting detailed documents for the NDA assembled, when the drug had a 10% chance of ever succeeding."*
CONTEXT:	*Time Period:* circa 1990 *Single Event:* Around a table with other drug development executives, during a "late-night" meeting– *"It was the first time, and maybe to some degree, a larger more rapid transformation of the company than any of this other language that has been described…and probably did more to change the way work got done…Got people immediately into action*." *BigPharma:* Overarching industry architecture dictated tightly linked stages of value chain activities, to distinguish themselves from all of the biotechs popping up. *Company Culture:* Hierarchy residuals from the "follow the template" code, where no one

	questioned the process; MEDRx was a "friendly company" where everyone tried to 'play nice' *Drug Development Culture*: A 500-person organization that was "dispirited and skeptical" *Core Competency for Value Creation Story*: Researchers in the lab "understood the science" and leadership wouldn't make the mistake of disregarding "that good science" *Tension*: Were trying to streamline their work but had never distinguished between the two parts of their business – experimental (Cup) and product development (Pen) – to speed up the process *Threat:* If they continued to spend so much in R&D and took too long to get a drug to the market, they may be acquired/merged (against what MEDRx distinguishes itself by – being a "large, unmerged entity")
OTHER INDICATORS:	*Narrator:* Interviewee who had been at MEDRx since 1977 and who was one of the members sitting around the table in this meeting when the original speech act was enacted.

Table 6. The Deliberate, Top-Down "Seven Essentials" Story

PLOT:	*Intentionality:* 7E was a deliberate strategic initiative to change the way MEDRx thought about how it was going to create and capture value, with flexibility given to figure out ways to go about it. *Consequentiality:* 7E outlined areas to improve efficiency, raise portfolio output, and better serve all stakeholders including patients.
ACTORS:	*Protagonist*: 7E was a deliberate choosing of words by MEDRx's newly-elected Chairman and CEO at the time *Antagonist:* The new Chairman of the board of directors, who had previously been MEDRx's CEO for the last 20 years (and who likely had a bruised ego when his replacement came in suggesting change) *Others*: The new CEO worked in concert with some consulting groups to maximize internal and external communication of MEDRx's 7Es.
VOICE:	Although the CEO had been with the company for many years, he was the "new guy" at the helm of MEDRx, who was trying to steer the ship in another direction…out into more open waters and employees seemed receptive
EVALUATIVE FRAME:	Things needed to be shaken up and changed a bit: "[These were] s*even things this company needs to get right. The seven things we can't afford to do wrong. The seven things that we must attend to every day. The seven things you can ask yourself, while you're driving to work every morning, how you can push [yourself] further along this axis."*
CONTEXT:	*Time Period:* circa Oct-Dec 1991 *BigPharma:* Overarching industry architecture dictated tightly linked stages of value chain activities, as opposed to therapeutic areas; thus, there were less clear structures and processes available to copy (for deciding how and who should get the finite corporate resources) *Company Culture*: Employees already had a set of practices to achieve standards in quality…to avoid getting their "butts kicked by the Japanese" again so the 7Es likely resonated with them. It was easier for them to rally around another "template" of essential work practices that was given to them by 'the boss.' *Core Competency for Value Creation Story*: "Wired for science" is the basis upon which the company thrives, and what drives MEDRx employees. *Tension*: The smart, high-caliber scientists, who'd prefer to do "one more piece of science" were not easily sold on the idea that the company needed to run efficiently to make profits, survive, and grow. *Threat:* MEDRx ran the risk of being out-discovered by other Pharma companies
OTHER INDICATORS:	*Narrator:* Interviewee who had been at MEDRx since 1977 and was not present when the original speech act occurred. Shortly after the speech act, he left stateside to take a new role as managing director of a pharmaceutical development center in Europe.

Table 7. The Emergent, Outside-In "Discovery without Walls" Story

PLOT:	*Intentionality:* Brought into the organization by a new hire and emerged in more localized "bailiwick" because it was believed DwW could speed MEDRx's process of discovery and help MEDRx become a breakthrough "R&D Engine." *Consequentiality:* DwW shifted the how of value creation to include external partnerships and licensing, thereby encouraging an 'outside-in' spirit of collaboration to augment MEDRx's own internal science.
ACTORS:	*Protagonist*: MEDRx's newly hired, Senior Vice President, Science and Technology and the director of MEDRx's Research Laboratory (MRL) *Antagonist:* The MEDRx scientists who believed that "it's my job to solve that problem" and if someone else does it, "then I'm not doing my job" *Others*: Other leaders in drug discovery and C-suite executives, who used the language (even in annual report communication)
VOICE:	As MEDRx's newly-elected SVP of Science and Technology, he wanted to communicate internally and externally about his research philosophy, which he later communicated as "research and development without walls" in a 1996 annual report
EVALUATIVE FRAME:	From the get-go, he wanted to partner and open up the front end of R&D (i.e. discovery research), to include working with academic groups, biotechs, consortia, and even learning from an individual's own insights and ideas: "*Not quite open innovation [language] because, you know, there was still a very closed shop mentality in those, in those late 90s, but there was also a strong business development unit. And so it might have been to engage them in the development of projects that had been licensed."*
CONTEXT:	*Time Period:* circa 1995 *Macro Context:* Trends providing the impetus for MEDRx's focus on innovation – revolutions in the life sciences and information technology, as well as the emerging patient-centered delivery concept of disease management. In particular, the open source code for Linux, had been shared in 1991, as a "new free operating system kernel" for people to use and collaborate together on *BigPharma:* Again, overarching industry architecture did not have business unit structures (to copy), which were responsible for searching for, scanning, and surveying external innovations *Company Culture:* Because of the "irreversible course" that the previous CEO put the company on (e.g. opening the company up more from its decades of being a holding company), employees were likely more receptive to DwW and the idea of collaborating *Drug Discovery Culture*: Not-invented-here (NIH) syndrome, which came from jealousy, ego, and personal identity conflicts with being good problem-solvers *New Mission for Value Creation Story*: Came about under another new CEO and Chairman, who was focused on growing MEDRx to be a global leader in providing "integrated healthcare solutions." "*to create and deliver superior pharmaceutical-based healthcare solutions – by combining pharmaceutical innovation, existing pharmaceutical technology, disease prevention and management, and information technologies – in order to provide customers worldwide with optimal clinical and economic outcomes."* (in 1995 letter to shareholder) *Tension*: While DwW was an interesting concept brought by a new hire and supported by senior leadership, the company did not yet have the structures and incentives in place to reward the type of open and collaborative behavior they desired. *Threat:* MEDRx ran the risk of not maximizing the concept of DwW by focusing more on how to make licensing agreements more productive
OTHER INDICATORS:	*Narrator:* Interviewee who had been at MEDRx since 1977 and was not present when the original speech act occurred, as he was the managing director of a pharmaceutical development center in Europe.

Selection. To understand the process of code emergence, I compare similarities and differences in how these three WAPVS (from the Process Era) evolve through the process of code selection. Sequences of selective speech acts and/or use cases pertain to the negotiation of shared meaning associated with each of the WAPVs identified above. Negotiating meaning can lead to an enriched understanding, an extended or qualified understanding, a revised or refined understanding, and/or a reinforced understanding of an existing aspect of the organizational code.

Instances of selection begin with situated discourse about the proper way to interpret a new WAPV, often based on salient elements of shared experience, such as values and strategic objectives in the corporate context, that resonate across the firm. In addition, it is this salience and resonance of a new WAPV that also act as a diffusion mechanism.

For instance, a given WAPV might be highly salient and resonate with every member of the firm if the CEO is eloquent, if the message is well connected to the strategic objectives laid out by leadership, or if the organization's members have heard the word repeatedly. However, a WAPV might not resonate because it is either too abstract, it does not connect with the context within which some organizational members work, or it conflicts with and/or is not novel enough compared with words they already use. Thus, salience and resonance are outcomes of the replication of efforts to demonstrate utility, or the spontaneous recognition of situation-specific utility.

Retention. Instances of retention pertain to the habitual practice of the fundamental meaning that a WAPV introduced or catalyzed into the organization, as people responded to it (through a process of negotiated meaning). At this stage, there is a lack of WAPV in speech acts and a complete assimilation of the meaning into everyday practices.

Thus, retention begins when a WAPV no longer plays a role in enabling members of the organization to see things in new ways. It is unquestioned and does not trigger reflection. It is embedded in ways of doing and enacted routinely in everyday practice, through the tacitly shared understanding, beliefs, and values of the organization (i.e. mindsets). It is effectively indistinguishable from other constructs that provide coherence to what members of an organization do. The language of 'why we do things' becomes the firm's collectively shared set of beliefs, values, and culture, and the language of 'what and how we do things' becomes the firm's collectively understood set of practices and routines.

For example, interviewees describe how "tailored therapeutics" was less about a significant change to the MEDRx business model and/or the direction of their research programs and more about a change in mindsets. They describe how researchers across the different therapeutic areas were always "following the science" (e.g. in precision medicine) and already had the tools and knowledge to design clinical studies to ensure medicine is used in situations that would have the most beneficial effects for patients. The most important thing about "tailored therapeutics" was the mindset change it generated within the organization, which had become embedded in the way MEDRx made medicines. It allowed the company to bring drugs to market with more and better information that allowed for distinctions to be made between subpopulations of patients that would benefit the most from the drug and/or the subpopulations of patients that should not take the drug, who were at a higher risk of having adverse side effects. TT led to change in employees' mindsets, reflected in different thinking about what comprises their work, how they do their work, and why this differed from developing blockbuster drugs. In addition, TT use cases linked thinking about value creation across the organization.

Thus, retention characterizes the new language's assimilation into routine practice and widely held values, as opposed to being rejected, selected out, and/or going dormant. Retention ends when a new situation triggers a re-examination of the WAPV and causes it to come back into conversation. In these cases, something has made it seem relevant, in a new way, as a source of a problem, or an aid in understanding a new situation.

Semiotic Sequences[25]. The code and its semantic context concurrently inform how members of the firm filter information and what captures their attention. These selective filters in the semantic context can be modified by the incorporation of additional WAPVs and/or by new interpretations and meanings of existing WAPVs. During this selection process – of creating situated resonance and salience – a use case for new language emerges, either through deliberate efforts (i.e. teleologic selection), through spontaneous recombination (i.e. evolutionary selection), through negotiated meaning triggered by conflict (i.e. dialectic selection), or through organic diffusion, such as boundary spanners translating the WAPV for different contexts (i.e. life cycle selection).

Each situation and semiotic sequence was about figuring out whether there was a reason for using that new language. The why, what, and how wasn't necessarily answered in the same way or in the same temporal sequence, but the deep structural elements were always there. Therefore, my theoretical hunch is that the organizational code is a useful tool for bringing about desired or necessary change in organizations (e.g. reorganizing drug development processes, decision-making for project and portfolio management processes, and/or restructuring of drug discovery processes).

[25] See Appendix F for examples of two of the memos I wrote (post interview) to capture the selection process of the C&P and 7E storylines. These memos provide more details, speech acts, and use cases underlying each storyline's diffusion, helping to better illustrate the evolution of the organizational code during the Process era.

Because questioning continually reshapes the filters that guide problem-solving and decision-making, the selection process continues as long as the WAPVs prompt questioning. Instances of selection end with the habitual, everyday use of the WAPV in conversation. Once its meaning is no longer contested, or no longer challenged by new situations, it becomes an integral part of how people think, filter information, and coordinate efficiently.

I examined the sequence of semiotic events evolving from each of the three original WAPVs identified earlier – C&P, 7E, and DwW – which infused new language and/or meaning into MEDRx's organizational code. Across these three storylines, there were similarities related to origins of subsequent WAPV variation (e.g. polymaths, externally engaged domain experts, consultants, external life events) and selective filters (e.g. accountability and status quo WAPVs); however, there were also differences in their origination instances (e.g. CEO deliberate, top-down strategic initiatives vs. internal problem-solvers' deliberate, bottom-up, emergent, creative efforts vs. external hires' deliberate, outside-in efforts), as well as the shifts in the previous and subsequent era's code language that reflect each storyline's targeted processes (i.e. consequences of the code) for MEDRx's value-creating and capturing activities.

The "Cup & Pen" Storyline. Although C&P emerged from a deliberate problem-solving event within the company (i.e. teleologic), it likely came about as a challenge to the previous era's code (i.e. dialectic). The previous Pill era had fostered a "pen-like mentality," stemming from the company's hierarchical, yet friendly, roots of not questioning others' work templates. While starting out more localized, C&P emerged to shift the why and when of drug development, focusing on reorganizing MEDRx to make more efficient decisions (e.g. "SWRT"). In the process, it got talked about in members' personal lives because it changed the way they understood what they were hired to do (e.g. "coat of arms").

In addition, C&P was used to call leadership out, for leaving some "Pen" parts of the organization not very well defined. One interviewee told a story that reflects a transition in meaning – more of a "cup versus pen" mentality:

"*this guy named Jack, who was an old crotchety analytical chemist. He was still in the lab, running assays day in and day out. Probably in his 50s or 60s…sitting there with a gruff look on his face, and he's steaming and he says, 'Look, you guys, all of you leaders, think that you invented Cup and Pen but you didn't. What we had before you made that difference is we had a box of shit. What you did is you took the box of shit we had before and you pulled a cup out of it. And then you thought what was left was a pen. But it wasn't. It was a box of shit without a cup in it. You never defined pen as its own entity. You just assume that once you pulled out a cup, the work was done and this organization is struggling because you went out and you defined this new exciting thing that people got behind and you left the rest of it defined by difference'."*

This made the "Pen" leadership listen more carefully to the [lack] of meaning surrounding the C&P language. In its evolution, C&P developed a refined meaning and understanding to better incorporate how the "Pen" world matters to transformational efforts, and eventually led to "heavyweight product teams." At this point, C&P was recognized throughout the company as the way the company does drug development and was no longer discernible in organizational language.

C&P's evolution of the organizational code's *why* and *when* around *reorganizing* allowed MEDRx to *speed the process* of getting a drug to market. This allowed them to be better organized around *drug development decisions,* with new practices becoming a retained aspect of the code's shared understanding that carried over into the "Patient" era. MEDRx continued to reorganize and make sense of new language (e.g. "sales force of the future," "the business unit model," and "bio-medicines") to create a "clear line of sight to the customer." But there are also new WAPVs, like "Next Generation R&D," that have required MEDRx employees to 'shift gears' to accommodate the language and understand/negotiate its meaning.

The "Seven Essentials" Storyline. While 7E came from the top to outline the company's strategic priorities (i.e. teleologic), it likely came about as an effort to shift the code from the previous era's "holding company" status (i.e. dialectic). 7E was intended to change the how and who focus of the firm's project and portfolio management, focusing on more effective decision-making processes. As a result, meaning was internalized throughout the organization and led to concrete initiatives, objectives, and targets (e.g. "Speed to Market" and "M2500"). New WAPVs were introduced that enriched the meaning and understanding of the 7E priorities and infused more details into the language of the organizational code (e.g. "the patient is waiting" poster). Specifically, PiW brought the human element to the forefront in why MEDRx was trying to speed the process of getting drugs to the market. 7E's evolution was also influenced by the invention of clocks, for the different therapeutic area teams in R&D, that "translated PiW into real currency." These patient clocks tracked the passing of time, not in seconds, but in the number of patients inflicted with specific diseases during that time.

7E's evolution of the code's *how* and *who* code language around *decision-making* allowed MEDRx to develop *processes* that *unified MEDRx's mission* and 'purpose for being.' This allowed them to make more *effective portfolio decisions*, instilling standards such as the "number of days for drug-to-market", which became a retained aspect of the code's shared understanding that carried over into the "Patient" era. MEDRx continued to make decisions with the "patient at the center" (e.g. "tailored therapeutics"). However, there are also new modalities that involve "drugging the undruggable" (e.g. gene editing, mRNA therapy). This requires different capabilities than their small and large molecule expertise and has required MEDRx employees to 'shift gears' to accommodate the language and understand/negotiate its meaning.

The "Discovery without Walls" Storyline. Through the turnover of one of the company's

key decision-makers – the SVP of Science and Technology, – DwW came about to "open up" MEDRx's innovation processes. Coming from the outside-in, DwW emerged to shift the "what and where" of innovation and focused on restructuring MEDRx to facilitate more adaptive search processes (e.g. "Office of Alliance Management" and the "Sourcing Innovation" business unit). DwW allowed for brainstorming conversations to take place (e.g. "Chorus," "Pharma Ecosystem," and "Innocentive"). Its meaning and language was extended and, based on other external factors, qualified through different programs (e.g. "Leadership Five"). The DwW storyline captures events that leveraged the "internet boom" and its associated networking capabilities (e.g. "e.MEDRx"). The resulting alternative business models and structures gave structure to many of DwW's ideas and took it "supernova." Once MEDRx realized it had torn down the walls to do drug discovery, they questioned whether they could expand the idea beyond discovery, to do "research and development without walls." This allowed for a richer understanding of the "Pharma ecosystem."

DwW's evolution of the code's *what* and *where* around *restructuring* allowed MEDRx to develop networking *processes* to become a "breakthrough innovation engine." This allowed them to make more *innovative decisions*, instilling new incentives for "moving on" and becoming a "solution finder," which became a retained aspect of the code's shared understanding that carried over into the "Patient" era. MEDRx continued to develop alternative structures (e.g. "FIPNet") to open up their company's search processes, looking for "compelling and transformative science" they could use to address patients' unmet needs faster (e.g. "Phenotypic Drug Discovery" (PD2), "Open Innovation Drug Discovery" (OIDD), and "Connected Diabetes Ecosystem"). However, there are new macro trends, like Internet of Things (IoT) that generate

language like “Beyond the Pill,” requiring MEDRx employees to ‘shift gears’ to accommodate the language and understand/negotiate its meaning.

4.2 SUMMARY: PHASE 3 ANALYSIS

In Phase 3 analysis, there were different patterns from which proof emerged. The eras allowed me to test and to see if the structure of my theory holds when language about value creation and capture is changing, when new CEOs come and go, when new thinking about strategy emerges, etc. In looking at speech acts across situations and time, I examined how and when the conversations at firm- or activity-levels started to reflect a new era – a shift in thinking about where value is coming from – that would change the way people assess the proof for each particular use case.

When I identified new words from interviews that had not been used to this point, it did not change the deep structure of the process. Rather, I found evidence of the firm trying to create a new use case for new language and generating proof for why it makes sense and how. The process reflected the influence of context on how use cases were emerging and how they were evaluated. These use cases and proof cycles were meaningful in intent and the consequences produced.

Strategic imperatives for value creation shape the firm-wide conversation about value creation, reflecting concern with a particular source of value or a need to create more value in a certain aspect of the business (e.g. “falling off the patent cliff”). Consequential outcomes of the

code relate to what changed, or how the WAPVs were useful in changing ways of thinking and practices.

Shifts in semantic context reflect the overarching shift in thinking about value creation and the more focal thinking related to how the firm currently creates value. These contextual aspects of each era (within which I was assessing the WAPVs and their use cases and proof cycles) describe the strategic imperatives and consequential outcomes of the organizational code. Eras influence words and focus but they do not change the process of code emergence. Based on my analysis of temporal, dataset, and inter-situational variation, I infer that MEDRx's code was evolving and was consequential in its balance of continuity and change.

5.0 DISCUSSION

The predominant conceptualization of organizational code, as the "language of work," is a language of stability, or status quo. Economic-based organizational theories treat the code as an integral part of an organization's invested infrastructure (i.e. irreversibility), inseparable from the organization's cultural-historical and/or socio-cognitive contexts (i.e. indivisibility), and understood across the entire organization (i.e. uniformity). These static, firm-specific, and uniform forces that explain efficiency, unique productive capacity, and knowledge generation underlie dualities of adaptation. Although its primary value is in enabling efficient coordination, Arrow (1974) suggests the organizational code also limits the 'agenda' of organizations. Thus, while the code is recognized as being centrally tied to inherent dualities of organizational life (e.g. flexibility and efficiency, exploration and exploitation), the existing literature describes implications of the inertial properties of an organizational code as tradeoffs (March, 1991).

In addition, there is very little said about the internal structures of organizational code (and how they interact) and there is nothing that describes the way the code is used in conversations and dialogue over time, which captures the changing contexts that give the lexicon of the organizational code its meaning. Since Arrow (1974) first articulated his information theory of organizations and explained the organizational code, the world has changed dramatically. Individuals connect fluidly with multiple, epistemic communities and knowledge

ecosystems that span occupational and organizational boundaries, and scientific and technological knowledge is widely accessible (Bueger, 2015; Cohendet, Grandadam, Simon, & Capdevila, 2014; Håkanson, 2010; Knorr-Cetina, 1999).

5.1 RESEARCH QUESTION – PART I

5.1.1 What is the Organizational Code?

As the literature maintains, the organizational code includes words that are both idiosyncratic, in terms of firm-specific origins, as well as jargon-related and more commonly used and accepted within industry, occupations, and professions. We do find evidence of stable aspects in an organizational code, where WAPVs used to communicate efficiently have longer 'shelf lives.' For example, in everyday, 'business as usual' jargon, one company uses the acronym "HCP" to denote healthcare *professionals.* By including doctors, technicians, prescribers, and nurse practitioners in HCP, the organization understands that there are many professionals who have rights to prescribe drugs, and they should not overlook non-doctor prescribers. However, it was noted that, to avoid confusion and a bad reputation, they are careful not to use these types of acronyms with their "healthplan" customers.

In both instances – of idiosyncratic language and common jargon – the language associated with these WAPVs have firm-specific meaning. I find evidence of the code as both firm-specific words (also acronyms, phrases, and visuals) and shared assumptions, beliefs, and

understanding of the why, what, and how of value creating and capturing activities embedded in practice.

My research illustrates a key insight about organizational code – the code is not inert. It is continually being reconstructed. Where and when its discernable, the code has a lot more to do with change than stability, as it captures shifts in the 'language we use to get work done.' The WAPVs that seem to stick in people's memory, that live on in the firm for a longer period of time, most often arise as enablers of change, rather than status quo.

In the context of a firm struggling with what might need to be done differently, finding the right WAPV can happen spontaneously, where the language is right the first time. Other times, finding the WAPV that can convey the nature of the desired or expected change requires a process of trying out words and learning about the associations people have with them. This happens when the change diverges more from the current mindset or when the language is being driven by a part of the organization that differs from where the change needs to happen.

Firm-specific WAPVs were most easily identified prior to the development of shared understanding surrounding certain elements of a novel conceptual space. Once shared understanding was attained, the WAPVs used to foster it (i.e. modular linguistic tools enriched through use cases) were more difficult to identify in discourse. I identified situations in which WAPVs were explained in more general terms as they were translated for different audiences (e.g. external stakeholders, C-suite executives, and firm-wide consumption). However, this did not necessarily result in the disappearance of the WAPVs in everyday practice. Rather, this translation occurred before the disappearance of the WAPV and allowed for the negotiation, refinement, contestation, and/or enrichment of the organizational code.

5.1.2 Disappearance of Firm-Specific Language

WAPVs emerge to address some tension and are reflective of the current culture and/or semantic context. In these situations, once the WAPV achieves its goal and no longer provokes reflective thinking (i.e. complacent in terms of 'business as usual') or changes in practice, it is no longer communicated in organizational discourse. My research uncovers three distinct scenarios to explain why this happens.

First, some WAPVs are replaced with more precise language as members of a firm are able to make their implications for practice concrete, such as through the identification of use cases. For example, the "Seven Essentials" language helped communicate what MEDRx needed to get right to succeed and why that was important; yet, it eventually disappeared from discourse and was replaced by "speed to market" and "MEDRx 2500" which, respectively, indicated speed as an essential focus for improving practices, and then provided a target – 2500 days – with which to evaluate the success of new practices. This linear refinement of broad WAPVs into more specific WAPVs occurred in several instances and always proceeded in a rather linear fashion, as initial understanding was enriched through the identification of use cases and their conversion into practice.

Second, at some point, WAPVs disappear from daily discourse, and this tends to coincide with their absorption into practice. With sufficient evidence that thinking and practices have changed, the firm-specific WAPVs are translated into the language of relevant occupations/professions, generic business terms, or industry language, for broader consumption, such as by shareholders and the board of directors (BoD). For example, the "Cup and Pen" language originated as the firm was seeking to accelerate drug discovery and development and

out of frustration with the inadequacy of the follow-the-template approach that had guided these activities for decades. The "Cup and Pen" language and visuals shifted the organization's attention toward being more mindful of why particular activities were enacted and when, which in turn stimulated new thinking about how to carry out drug discovery, and later drug development, as two very distinct activities. By repeatedly returning to the "Cup and Pen" language, and enriching it with new use cases, MEDRx was able to transform thinking and practice in these activities, cutting out substantial waste in time and resources in the process. Once new MRL facilities were built for drug discovery activities (i.e. the Cup world) and heavyweight product teams were established for drug development activities (i.e. the Pen world), "Cup and Pen" language had effectively been assimilated into practice and eventually disappeared from organizational discourse. To communicate these achievements to their corporate board, investors, and industry analysts, leaders of the drug discovery and development units translated the Cup and Pen language into generic business language.

Finally, sometimes WAPVs appeared, became a part of discourse for a time, then disappeared from daily conversation without having been converted into practice, but remained 'on the shelf,' poised for possible future use. This characterized a set of WAPVs that captured visionary thinking in the organization but had not yet taken off to shape practices firm-wide. For example, "Fully Integrated Pharmaceutical Network" (FIPNet) was a term used to convey how MEDRx could function as a networked organization, especially in the operation of its research activities, in contrast to its history as a "Fully Integrated Pharmaceutical Company" (FIPCo). There is still a belief that FIPNet will have impact over time, such as by helping the firm to distinguish what value creating activities to pursue internally versus/and externally, and by suggesting how to integrate those activities across the firm as a networked organization.

Nonetheless, it is not a widely used term currently; it has tended to go in and out of use in organizational discourse. As explained by one former MEDRx interviewee,

"FIPNet, which I considered a genius term and would have leveraged to the hilt…I don't think it caught on very well and yet 'Cup and Pen' did…There seems to be just some very complex coincidences that occur when language gets traction and when language doesn't get traction. And while you can try to push it from the top, and while that may very well indeed be the initiation moment, that doesn't necessarily guarantee that it's going to enter the cultural lexicon."

Such WAPVs appear to be ahead of their time in terms of moving thinking forward significantly and quickly. They tend to recede to make room for language that helps people do their everyday work. Thus, there tends to be more of an ebb and flow with these revolutionary WAPVs.

5.1.3 The Ostensive Code

An ostensive view of organizational code is useful to convey its overarching meaning, by pointing out distinct archetypes, categories, and/or examples of the organizational code. An organizational code may often be conceptualized this way because it is difficult for organizational members to define their unique, firm-specific code verbally, because the words will not be understood to "outsiders" (as with new speakers of a particular language). It may also be captured by 'shorthand' because the nature, or the meaning, of the code is too abstract and holds a lot of tacit knowledge that is more efficiently and clearly communicated.

The ostensive view assumes power is centralized and action has intended consequences. Further, when viewed over long periods of time, the code's ostensive aspects can appear "already made," and may be characterized (usually after-the-fact) as stable, coherent, and linear in its development (Boedker, 2010). Therefore, the code's enactment appears to occur through controls

that are assumed to remain constant, and the role and influence of the CEO is a key determining factor in the 'what, how, and why' language of the organizational code. Examples of the ostensive aspects of MEDRx's code include "Cup & Pen," "Seven Essentials," and "Discovery without Walls."

5.1.4 The Performative Code 'in Action'

A performative view of organizational code examines the capacity of a communication event or a speech act to consummate an action, as it relates to an organization's value-creating and capturing activities. Thus, the formation of an organizational code is continuously being redefined through speech acts and symbolic communication.

The performative view assumes power is distributed across a diverse set of actors and actor-networks. Further, when observing speech acts, the code's performative aspects appear to be a complex and "messy" process, and may be characterized as variable, unpredictable, emergent, and constantly changing (Boedker, 2010). Therefore, the code's enactment – the 'what, how, and why' language of value – is in the consequential, every day, internally and externally-engaging practices of work, problem-solving, creativity, strategic directives, etc. Performative aspects of are captured in the multitude of speech acts and proof cycles that relate to the meaning of the concept, the meaning of the firm-specific language, the meaning of its changed practices, and the meaning of its significance. For example, MEDRx's "Cup & Pen" WAPV includes: "coat of arms" and "SWRTs," which generated localized meaning through practices within drug development units and "designer dress teams;" "heavyweight product teams" which synchronized meaning through practices across drug development units, and; "Pen

is just a box of shit without a cup in it," which modified meaning through practices across the organization.

5.2 RESEARCH QUESTION – PART II

5.2.1 How Does the Organizational Code Emerge?

In line with principles of practice theory, I view the situated relationship between the changing words and everyday practices as mutually constitutive and consequential in organizational members' understanding of the organizational code. By examining the code 'in action,' I am able to demonstrate how a plethora of new words come into play, transform thinking, and thereby, change work practices.

The emergence of an organizational code is driven by the iterative and continual reconstruction of WAPVs from the organizational code. This iterative cycle involves the introduction of a new WAPV (e.g. niche, high value), the situated context in which meaning around this new WAPV is made and/or contested, the localized practice that comes about from interpretation of this WAPV, and the meaning that emerges from a new understanding of a practice. From there, it cycles back to the WAPV language, but may start in a different place (e.g. targeted therapeutics, tailored therapeutics), to begin the dynamic process again and establish the 'language of why we work.' Use cases are then generated to better capture shared understanding of the 'language of what work we do' and the 'language of how we work.' See

Figure 5 for a diagram of the semiotic sequences involved in assimilating a new WAPV into practice.

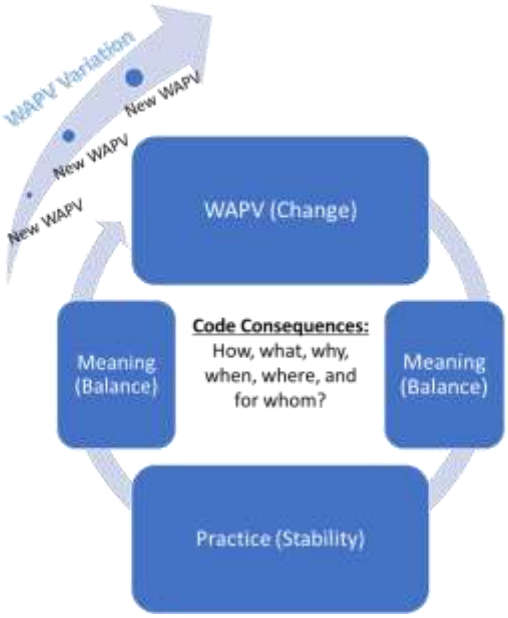


Figure 5. Semiotic Sequence of Code Assimilation

When this dualistic relationship between language and practice, or talking and doing, is visible, there are changes to the way work is being done in the firm. Meanings for the consequential language surrounding what, how, and why work gets done, is continuously being created and recreated, thus providing balance to the organization. When the meaning in practice is stable (i.e. once there has been a uniformly understood translation of a WAPV into practice through the generation of a use case catalogue), it is no longer communicated. Thus, by rejecting the dualism of firm-specific circumstances that generate the code and its [initial] meaning and by embracing the situated code 'in action,' one can better understand the code's role in both stability and change.

A practice approach allows a view of the code's deliberate and emergent evolutionary processes as different outcomes of the same dynamic inherent in meaning-making, rather than different dynamics. This is similar to Feldman's (2000) initial discussion of routines as a source of continuous change because of their internal dynamic – a dynamic that cycles among actions, plans, ideas, and outcomes. This cycle provides for both effortful and embryonic accomplishments, as people take different actions and create and recreate connections in the course of enacting multiple iterations of a routine (Feldman & Rafa, 2002

5.2.2 Leader versus Follower

The firm-specificity of an organizational code reflects a commitment that organizational members make, based on the creation and propagation of WAPVs and the use cases that get generated to solidify the language used to describe why, what, and how members go about doing their work. Thus, evidence of these types of firm-specific investments may be an indication of organizations who are better at leading change. Whether the trigger is an external change in the environment or a new CEO with a vision to create a different future, firms that invest in revitalizing their code through novel WAPVs likely do so because they must create a conceptual space that does not exist outside the organization. The emergence of novel WAPVs suggests that a firm has not found – in the industry or occupational jargon or in other firms' rhetoric – language that suggests possibilities for value creation and capture that resonate internally.

By examining the organizational code within and across firms, one may be able to identify leaders and followers in an industry, in terms of an organizational code's ability to keep a firm at the forefront of change. Firms that can continuously create and sustain firm-specific

language may more efficiently and effectively utilize language as a tool to innovate faster and more often. Leading in the assimilation of a novel business concept, whether it is based on nascent science and technology or a set of disruptive practices [like Total Quality Management (TQM) and open innovation (OI) were at the time they were introduced], requires firms to engage in a great deal of translation. This translation is accomplished via speech acts, to create what the concepts don't clearly convey.

Nascent concepts do not come with specific instructions for practice, so leading in the assimilation of a concept like PM or OI means creating a language with which to guide internal efforts to put that concept to practice. Similarly, translation into words that have firm-specific resonance is required when WAPVs are created to translate a strategic imperative to inspire new ways of thinking throughout the firm or when a polymath sees a concept describing what he or she thinks the organization could be. As a byproduct of this, the domain of practices that are affected by the new concept/language will differ across firms that lead this type of change.

For example, at MEDRx, WAPVs that emerged to explore what PM meant for their organization, such as "tailored therapeutics," led to a distinctive set of use cases across the value chain and inspired new thinking with a focus on creating and maintaining a "clear line of sight to the customer." Firms that, in turn, learn from these leaders and assimilate concepts the leaders either pioneered or were early to assimilate, will likely differ to a lesser degree in their practices, because the language for the concept would now have specific examples of practices. Common understanding about what the concept really means for practice would be more concrete and commonly understood across firms within the industry.

Further, based on Arrow's (1974) information economics perspective, organizations invest in firm-specific language where the costs of such investment warrant. In a diversified

corporation, perhaps it only makes sense to invest in firm-specific language for the interfaces between businesses, because this is where the firm's unit value-added comes from. Corporate membership adds value through centralizing the investment function and using firm-specific knowledge to make unusually efficient resource allocation decisions. On the other hand, corporations that consist of related businesses and add value by transferring and recombining resources across businesses would need other kinds of firm-specific language, so that the opportunities to do so can be recognized and acted upon efficiently within the firm than through the market.

Therefore, I would suppose that there are obvious differences in corporate diversity and the firm-specificity of organizational code. For example, those companies within the drug manufacturing industry that are more diversified in terms of having other related divisions to pharmaceutical drug discovery and development (e.g. diagnostics, medical devices, generics, consumer healthcare products, etc.), likely do not invest as much in firm-specific organizational language. Relatedly, I would suppose that those firms that are more 'pure play' companies in the drug manufacturing industry (i.e. focusing on only one therapeutic area, like oncology), invest more on creating firm-specific language and generating use cases to develop the right language for why, what, and how things are done around here.

5.3 RESEARCH QUESTION – PART III

5.3.1 What is the Organizational Code's Role in Managing Dualities?

The code is always in some degree of flux. Through multiple iterations of semiotic sequences, it becomes easier to explain the amplification, synchronization, and/or modification of changes in thinking that are occurring, as this cycle continues to play out. Further, the situated meaning-making enables a balance – between the changes in firm-specific language and its everyday practice and the continuity and enrichment of the mindset captured in the existing organizational code.

By describing how a situated context extends to the everyday problems that generate the code's WAPVs and their subsequent interpretations, I show an organizational code that is more adaptable to the complex problems organizations are best suited to solve (Williamson, 1975; Kogut & Zander, 1996; Nickerson & Zenger, 2004). In terms of creating new knowledge, the semantic aspect of information is more relevant as it focuses on conveyed meaning. Therefore, the boundary of an organizational code is less determined by the content of its compositional elements and more by the contexts in which a new WAPV is communicated and its meaning understood, employed, and shared throughout the organization. Rather than a static, uniform, and firm-specific asset, organizational code should also be understood in terms of an evolutionary process of social interaction that "organizationally" amplifies the knowledge created by individuals and crystallizes this meaning as part of the knowledge infrastructure of the organization (Nonaka, 1994; Nonaka, Takeuchi, & Umemoto, 1996; Spender, 1996).

5.3.2 Core Theoretical Contribution

While each of MEDRx's organizational code eras differed in features of their environment, organizational context, and strategic imperatives, I found evidence that the process of generating proof of the why, what, and how of firm-specific language through compelling use cases holds over time and across different CEOs. Through this process, I demonstrate how language is a tool for catalyzing change within an era and for bridging continuity across eras. In Figure 6, I highlight the organizational code's contextual and structural elements that play a role in managing the dualities of continuity and change in MEDRx. Throughout each era, I am able to make a distinction between the stable elements of MEDRx's identity, image, culture, values, and beliefs/norms and the continuity and change enabled by the organizational code.

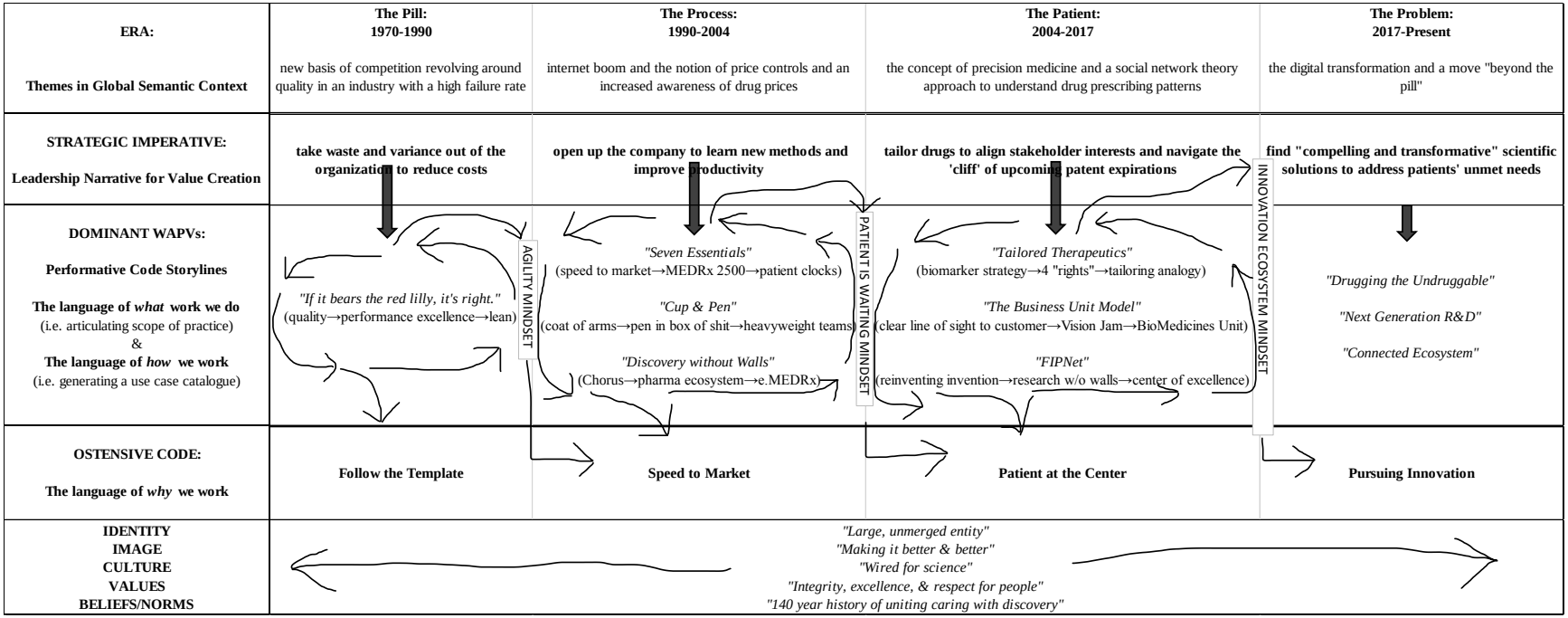


Figure 6. The Role of MEDRx's Organizational Code in Managing Dualities

The organizational code, as firm-specific language and its practice, is bounded by the words, acronyms, phrases, and visuals (WAPVs) its organizational members use to coordinate and to discuss the why, what, and how of key value-creating and capturing activities. Yet, these WAPVs allow for new questions to be asked. A WAPV acts as an archetype that captures rudimentary structural elements of the conceptual space. Use cases are enacted to describe the kind of value that the language is articulating as well as to generate proof as to how the language provides value for different people in the organization. As a result, new and different WAPVs emerge to create an organization-wide shift in thinking and understanding.

In Figure 6, I outline each era's theme in the global semantic context that influences MEDRx's strategic imperative. This, shapes leadership's strategic narrative and provides an anchor for, or an impetus to, identify a different source of value creation. For example, in the Pill era, because of competition in the Japanese and American automotive industries, quality became a central focal point in many other industries. Therefore, a predominant narrative in MEDRx was about highlighting the importance of taking waste and variance out of the organization to reduce costs. This strategic objective created a semantic context in which the phrase, "If it bears the red lilly, it's right," became more salient and resonated throughout the organization.

From this predominant WAPV emerged a semiotic sequence of new language, meaning, and practices around quality, performance excellence, and lean best practices. These semiotic sequences helped articulate the scope of the MEDRx 'language of what work we do.' In the context of a particular semiotic sequence, WAPVs might convey that the change largely pertains to and/or is anchored in modifications to existing decision-making processes, to allocation of

decision rights and responsibilities, to restructuring work flows or work boundaries, or to redesigning work practices.

The MEDRx 'language of how we work' generated a use case catalogue for current, new, and emerging WAPVs. This cycle of experimentation led to 'follow the template' practices that shaped the 'language of why we work' in that context (i.e. Pill era). Thus, the current era's ostensive code of 'follow the template' had become the firm's dominant value creation focus, influencing how use cases made language resonate and become more concrete for its organizational members. This iterative cycle of generating proof for the what, how, and why of MEDRx's firm-specific language led to a collective shift in its shared meaning and created an "agility mindset" within MEDRx, enriching the current era's ostensive code and providing a basis for continuity going into the code's next Process era.

Based on the timeframe of my longitudinal study, I could gather more examples of WAPVs in the Process and Patient eras. This allowed me to trace the dominant WAPVs' semiotic sequences across time and identify each of their performative code storylines. As was the case in the previous era, the enriched organizational code (e.g. "agility mindset" + "follow the template" collective set of beliefs, practices, and language), together with the current leader's strategic imperative, influenced the emergence of new WAPVs and their use case patterns. For example, the "Seven Essentials" language was replaced (and its meaning enriched) through the creation of new language and visuals, such as "speed to market" "MEDRx 2500," and custom-made patient clocks. These WAPVs helped articulate the scope of practices related to decision-making and generated use cases that more clearly demonstrated the value of this language in terms of how members got work done [more quickly].

The "Cup and Pen" and "Discovery without walls" storylines were more related to practices surrounding reorganizing and restructuring language, respectively. These three semiotic sequences and their patterns of use cases shaped the Process era's ostensive code of "speed to market." For example, MEDRx 2500 (a new WAPV/objective stemming from "Seven Essentials") emphasized the number of days members were striving to meet in terms of the time it took to get a drug to the market. Heavyweight product teams (a new WAPV/work flow restructuring initiative) emphasized the company's ability to "shave off 18 months" when launching new drugs. Chorus (a new WAPV/alternative division) was all about truth-seeking (rather than success-seeking) that would allow members to more quickly identify which molecules were likely to fail.

The 'language of what and how we do work' created a "patient is waiting" mindset that helped to shift MEDRx's inward focus – on figuring out why processes were taking so long – to a more outward perspective – on figuring out how to better meet the needs of patients and customers. This mindset enriched the 'speed to market' meaning of the 'language of why we work,' which provided continuity going into next Patient era, where more change in language was introduced.

In Figure 7, I use different colored horizontal bars to highlight the changing/updating aspects of the code's WAPVs and use cases surrounding the language of what and how across time. With the accumulation for the vertical stacking of each bar, I also highlight the stabilizing/enriching aspects of the code's practices and meaning surrounding the language of why.

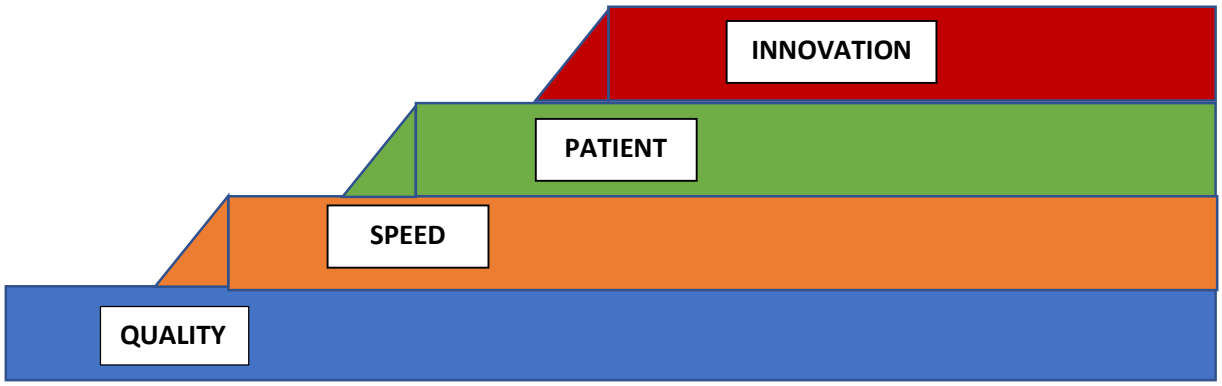


Figure 7. Continuity and Change in MEDRx's Organizational Code

6.0 CONCLUSION

The organizational code is a fundamental construct in important theories of organizations but is under-theorized. A widely accepted conceptualization of the code links it to inertial tendencies of organizations, which underlie a fundamental choice between efficiency and adaptability. However, research applying a practice lens has enriched our understanding of central organizational constructs, such as routines and resources, by questioning their constitutive nature and the ontological and epistemological assumptions upon which their conceptualization has been based. Likewise, I pose the question – *what is the organizational code?* – to continue to advance our understanding of concepts central to whether, when, and how firms can manage the duality between efficiency and adaptability. I undertake a qualitative study to evaluate and characterize the nature of the organizational code. Using an abductive analytical and theorization approach, we draw upon economic and sociological theories of the firm and practice theory, to enrich our understanding of the organizational code and its role in managing the dualities of stability and change.

APPENDIX A

OUTPUT TABLES FROM PROBLEMATIZATION PROCESS

A.1 CONSTITUTIVE ASSUMPTIONS OF ORGANIZATIONAL CODE

Composition	Properties	Focus of Properties	Consequential Trade-Offs	
Idiosyncratic Lexicon	Irreversibility - Static	Efficiency of Taken-for-Granted Assumptions	Effective Decision Making	Risks Not Being Able to Adapt
Shared Meaning	Uniformity - Uniform	Efficiency of Mutual Understanding	Effective Coordination	Risks Unanticipated Obsolescence
Context	Indivisibility - Firm-Specific	Efficiency of Specialized Language	Effective Problem Solving	Risks Limiting Agenda, Missing Opportunities

A.2 EPISTEMOLOGICAL ASSUMPTIONS OF ORGANIZATIONAL CODE

Constitutive Properties	Evolutionary Processes	Properties of Processes	Requirements for Adaptation	Mechanisms for Adaptation
Irreversibility	Time-Bound Path Dependence	Inflexible, Static Meaning-Making	Design Code to Increase Capacity of Agenda	Agenda-Setting, New Decision Rules
Uniformity	Socialization & Learning	Coherent, Uniformly Held Meaning-Making	Encoding of New Experiences	Turnover
Indivisibility	Accumulation of Directives	Embedded, Firm-Specific Meaning-Making	Paradigm Shift of Decision Makers	Circulation of Elites

A.3 ALTERNATIVE ASSUMPTIONS OF ORGANIZATIONAL CODE

Composition	Dualities in Compositional Elements	Properties	Focus of Properties	Consequential Dualities		Properties of Evolutionary Processes	Requirements for Adaptation	Mechanisms for Adaptation
Problem-Solving Lexicons	Over-Socialized & Under-Socialized Embeddedness	Fluidity & Irreversibility	Problems	Local	Global	Everyday, Emergent, Bottom-Up Practices & Occasional, Deliberate, Top-Down Initiatives	Manage Context *for* a Balance of Dualistic Properties	Variation - Dialogue & Debate
Multiple Shared Meanings	Institutional Memory & Unique Experiences	Variability & Uniformity	Mental Models	Individual	Collective			Selection - Conversation & Experimentation
Situated, Activity Contexts	Habit & Intentionality	Plurality & Indivisibility	Liminal Boundaries	Internal	External			Retention - Action & Interaction of Discourse

A.4 FUTURE RESEARCH AGENDA OF THE ORGANIZATIONAL CODE

Type of Research Question	Research Questions	Methodological Implications
'Whether'	*1) What does context-specificity in the code look like?* *2) How do external stakeholders influence the code?* *3) Do firms work with multiple problem-specific lexicons or do they utilize a singular lexicon that allows for multiple aspects of meaning-making and understanding across the problems it tackles?* *4) Does a [limited] activity scope of the code have any consequence for the core predictions of TCE or KBV?* *5) How does a relevant code for addressing a specific class of problems differ across firms?*	'Problem-Specific Lexicons' as a Primary Unit of Analysis to Assess Content of Organizational Code; Narrative, Discourse, Rhetorical, & Semantic Linguistic Analysis (of the 'code in action') as Useful Analytical Techniques
'How'	*1) What mechanisms connect local (activity-specific) evolution in the code with the language and meanings that are held firm-wide?*	VSR [Co-]Evolutionary Mechanisms as an Important Conceptual Framework to Bridge Levels & Units
'When'	*2) How do rapid, frequent, or continuous evolutionary sequences aggregate to slow, infrequent, or episodic evolutionary pathways?*	Immersive, Contemporaneous Case Studies Coupled with Longitudinal Studies of Discourse as Useful Research Design

APPENDIX B

INTERVIEW PROTOCOL AND GUIDE TEMPLATE

B.1 PRIMARY INTERVIEW OBJECTIVES

Get to "know" MEDRX Company as well as possible – their values, how they would describe what makes them distinctive from other Big Pharma companies, how they operate. Who makes change happen at MEDRX? What triggers change? How does it get done?

B.2 RELATED INTERVIEW OBJECTIVES

Understand major strategic initiatives, challenges, opportunities during his tenure at MEDRX. Ask about specific projects/initiatives. If familiar, then ask about how it came about, how it was launched, what were the major hurdles, milestones, accomplishments, what changed because of it?

As the conversation unfolds, start to ask language-related questions, like "How was that initiative introduced? In what ways and how did it change the way people work or interact across the organization (i.e. how they coordinate)?

B.3 INTERVIEW SCRIPT

Good afternoon. Thank you so much for agreeing to talk with me about your experiences working at MEDRX. I am studying how the language(s) used in organizations helps and hinders their capacities to adapt to changes in their environments and to transform aspects of their business model. A key tenet in organizational theories about this is that each organization has an idiosyncratic language, but we know very little about how these languages differ and how they evolve to accommodate change.

I am studying organizational language using published texts - such as speeches, letters to shareholders, and interviews – which are particularly important since this is how we understand whether there are multiple languages within an organization and how they connect people within the organization.

I would like to make sure that I capture your words/meanings accurately. Do you mind if I record our conversation, so that I can listen fully rather than trying to write and listen? Individual and organizational identities are kept anonymous, except in the case where a CEO wishes to have his or her identity or the firm's acknowledged. After I transcribe the interview from the recording, I will send you the transcript so that you can make sure what I have captured is factually correct and complete. Before we go any further…do you have any questions for me?

B.4 INTERVIEW QUESTIONS

1. LANGUAGE: *How would you respond to the claim that MEDRX has a distinctive language that makes it unique from other Pharma companies?*
    - *In what ways is it unique?*
    - *What role does it play in the organization?*
    - *Any examples of this distinctive language that stands out?*
    - *How do you know if/when it's different from other companies?*
    - *Has this language or the meaning surrounding the language changed in any significant ways over the course of your time with MEDRX?*
    - *Did you ever find yourself having to translate it? How? To whom? And in what ways did aspects of the language change?*
    - *Any occasions or experiences where you were and weren't able to change aspects of the firm's global language (e.g. RESONANCE, SALIENCE, OR OTHER SELECTION/RETENTION, GLOBAL/LOCAL, BOUNDARY OBJECTS/SPANNING)*
2. IMPACT: *How would you characterize the impact that you had on MEDRX, over your 37 years with the company?*
    - *What seemed to bring about that impact?*
    - *If there were multiple areas of impact, how would you characterize them, in terms of what they helped shape, define, transform, etc. (e.g. strategy, process, structure, culture, language, environment, etc)?*
    - *How have you assessed/measured achieving that impact? (e.g. profit, growth, shareholder value, patents, publications, NDAs, pipne, incentives, hiring decisions, initiatives, values, etc)?*
    - *What about implementing, leading, and sustaining those initiatives was the hardest? (i.e. the most difficult to affect)?*
    - *What were key differences in how you had impact from the beginning/middle of your tenure vs end?*
    - *Do you think the way you enacted the CEO role was different or similar to other CEOs? (e.g. priorities, communication, allocation of authority, etc.)*
    - *What was it like continuing a previous CEO's initiatives versus initiating your own as CEO? (differences in the focus of the Pill, Process, Patient eras – what distinguished them, what carries forward, what gets left behind?)*
    - *Were there any things that happened that you wished hadn't?*
    - *Is there anything that comes to mind that you would have done differently?*

INITIATIVES: Explain that I have learned a lot about the origins and unfolding of several cod words, from previous interviews and reading LtoS – but I would appreciate a brief recounting of events from him. And any observations he might have about: Whether he had a different perspective on the initiatives before and while CEO

(Old) - Often language reflects different ways of working, and thinking about the value of work. From my interviews with Interviewee1, I've learned of many MEDRX-specific words, phrases, acronyms, and visual boundary objects, such as "seven essentials", "speed to market," "the patient is waiting", "Cup and Pen," "research without walls", "molecule.com," and "Chorus." I beve this language is what makes/made up MEDRX's organizational code during a particular period of time. We have seen how certain aspects of a firm's environment, its existing culture, strategic context, etc., act on the code, by affecting its salience and resonance throughout the organization. Thus, these words/phrases were able to get selected into attention, as active information filters for organizational members to communicate, collaborate, and coordinate.
(New) - I've also come across language in MEDRX's letters to shareholders and other sources of external communication, such as "truth seeking", "tailored therapeutics", "Years X", "FIPNet", "Years YZ", "Next generation R&D", "Connected ecosystem" (many initiatives that previous interviewee couldn't really speak to).

3. EXTERNAL INFLUENCE: *Can you help me understand why you and/or your predecessors chose those words to communicate to external stakeholders?*
    - *How were they useful in external communications and collaborations?*
    - *How are they similar to or different from the language being used inside the company to talk about the same thing?*
        - *What did those words mean to you?*
        - *What did they mean to employees inside MEDRX?*
        - *Do you recall how/when you used these terms to communicate internally?*
        - *Do you think other groups at MEDRX uses and understand these terms in the same way?*
    - *Can you recall which of these phrases started with you and/or how you came up with the language? Any significant phrases missing in this list?*
    - *Can you elaborate on any significant differences in the way(s) other CEOs used language to affect change, mobilize organization, frame initiatives, etc. in relation to background/experience?*
4. *Thinking outside of the company, what kind of things/events could have broadly influenced organizational members' ways of thinking? [See below for possible historical events and industry events]*
    - *How do you think it affected the organizational code, or language, if at all?*
    - *Is there anything you would like to add? Any reflections on the roles that language plays, at MEDRX, in coordinating problem-solving efforts and enabling coordination and collaboration across the organization?*
5. RETENTION: *From your 30+ years at MEDRX, what would you say changed most significantly within the company?*
    - *Who/what was influential in bringing about this change?*
    - *How was there closure to this change? (i.e. done upon completion? milestones, folded into new processes/routines or boundary objects?*
    - *Do you think the culture of MEDRX was different than when you first came to MEDRX? If so, in what ways?*

- *Where there any other broader time periods that could be classified as having a distinct organizational code – the unique language members of a firm use to communicate, collaborate, and coordinate?*

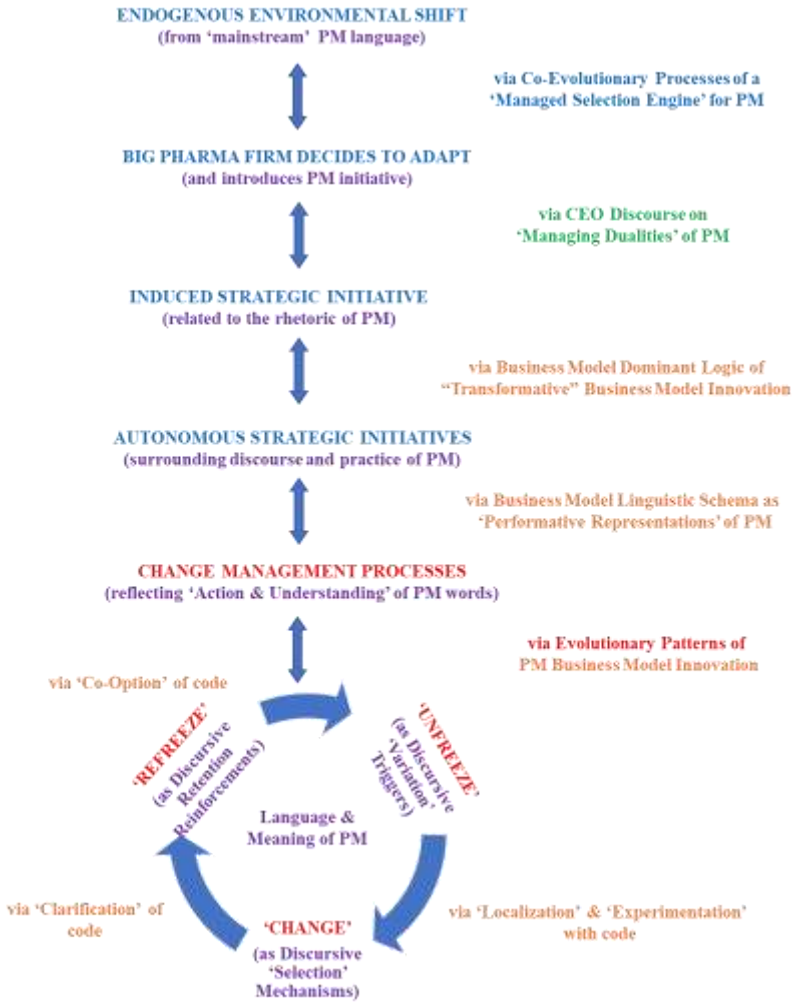
APPENDIX C

TABLE OF THEORETICAL SUPPOSITIONS

Theories: Sources of "Variation"	Observations: "Consequences-in-Action"	Gaps in Suppositions
Theoretical Lens 0: Practice Theory	**Supposition 1.0:** *To understand evolution in the organizational code, we focus on the deliberate and emergent interplay between words and action, rhetoric and initiatives, discourse and practice.*	We do not know how the 'local' code diffuses to influence the 'global' code
Literature Stream 1: Dualities in Organizing	**Supposition 1.1:** *Those firms (and their CEOs) who are better able to manage and resolve contradictory tensions will be more effective at assimilating revolutionary business model concepts and sustaining efforts to transform their business model.*	We do not know how the processes of managing dualities unfold
Literature Stream 2: Organizational Adaptation & Change Management	**Supposition 1.2**: *In responding to forces for potentially transformative changes in their industry, we expect established firms to move through phases such as unfreeze, change, refreeze and/or evolutionary processes of variation, selection, and retention.*	We do not know how these evolutionary phases/stages combine, overlap, and interact with VSR mechanisms to affect the process of organizational adaptation
Literature Stream 3: Co-Evolution of Ambidextrous Organizations	**Supposition 1.3:** *Because of the spatially- and temporally-distinct elements of organizational adaptation [in a learning, ambidextrous organization] and the internal and external interfaces of organizational boundaries, there will be overlapping patterns of micro-, nested- and co-evolutionary cycles in a firm's sustained efforts to transform its business model.*	We do not where and when the iterative and recursive VSR mechanisms interact to aggregate and shift these nested and mutually constituted co-evolutionary cycles to the next phase/stage
Literature Stream 4: Business Model Innovation	**Supposition 1.4:** *The major foci of a firm's [communicative] efforts will be on discerning new sources of value it can create, validating its ideas with internal stakeholders, seeking to establish these ideas' legitimacy with external stakeholders, and identifying new and/or reformulating existing internal and external partnerships to support their new value creation initiative.*	We do not know how business models [as cognitive linguistic schemas] change in relation to its everyday "performances" across actors, audiences, locations, and time.

APPENDIX D

SUPPOSITIONAL PROCESS MODEL



APPENDIX E

USE CASE PATTERNS FROM EXTERNAL SPEECH ACTS

E.1 "TAILORED THERAPEUTICS" SPEECH ACTS TO INVESTOR AUDIENCES

Use Case Patterns (Communications to Investor Audiences):

Revolutionary use cases (variation) → Business-as-usual use cases (selection)→ Tailored therapeutics no longer communicated (retention/rejection)

> *"The challenge for us as an industry, as a company, is to move from a blockbuster model to a targeted model. We need a better value proposition today."* – MEDRX CEO, Jul 2005, NYTimes interview

1) New Value Principle Explained: Articulated to shareholders as a means to **transform** old business model

> Speech Act (requiring time from investors): *"Establishing this new model will take years."* (2005 LtoS)
> Speech Act (vowing to transform the company): *"Transformation cannot consist of tinkering at the margins…No part of Lilly be will exempt from change."* (2006 LtoS)

2) Old Value Principles Enriched: Articulated to shareholders as evidence for old business model **extension**

> Speech Act (requiring continued resources from investors): *"To invest in this transformation, we must dramatically improve the productivity of our current business model."* (2005 LtoS)

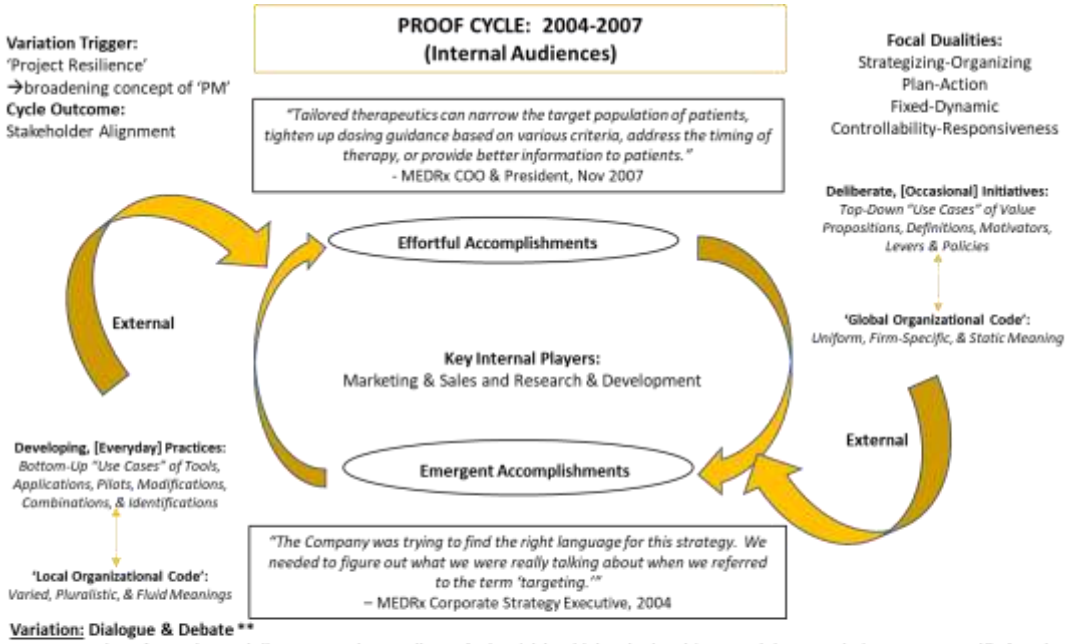
3) Validation of 'Business as Usual': Articulated to shareholders as proof they have the means to **change** and that they have changed their **business model**

> Speech Act (suggesting existing opportunities are being addressed): *"90% of our clinical candidates have biomarkers associated with them."* (2005 LtoS)
> Speech Act (maintaining they have changed): *"I've reported on our efforts on many fronts to improve the speed & power of R&D at Lilly [by] applying tailoring strategies to virtually every molecule in clinical development."* (2010 LtoS)

4) Managing the Duality: Finding a **balance** between new, emergent value creation opportunities and familiar value creation logics

> Speech Act (thanking employees for their efforts): *"I remain deeply appreciative of the level of commitment, the level of professionalism, and the combined and individual expertise that* [they] *bring to this enterprise."* (2010 LtoS)
> Speech Act (blessing the changes): "[These things] *reaffirm my conviction that Lilly has the intellectual capital, the tools, and the determination – along with the financial strength – to meet this moment and seize the many opportunities before us."* (2010 LtoS)

E.2 PROOF CYCLE – INTERNAL AUDIENCES



Variation: Dialogue & Debate **

- **Contestation of meaning and divergent understandings of what 'niche, high value' and 'targeted therapeutics' meant to specific functions within org**

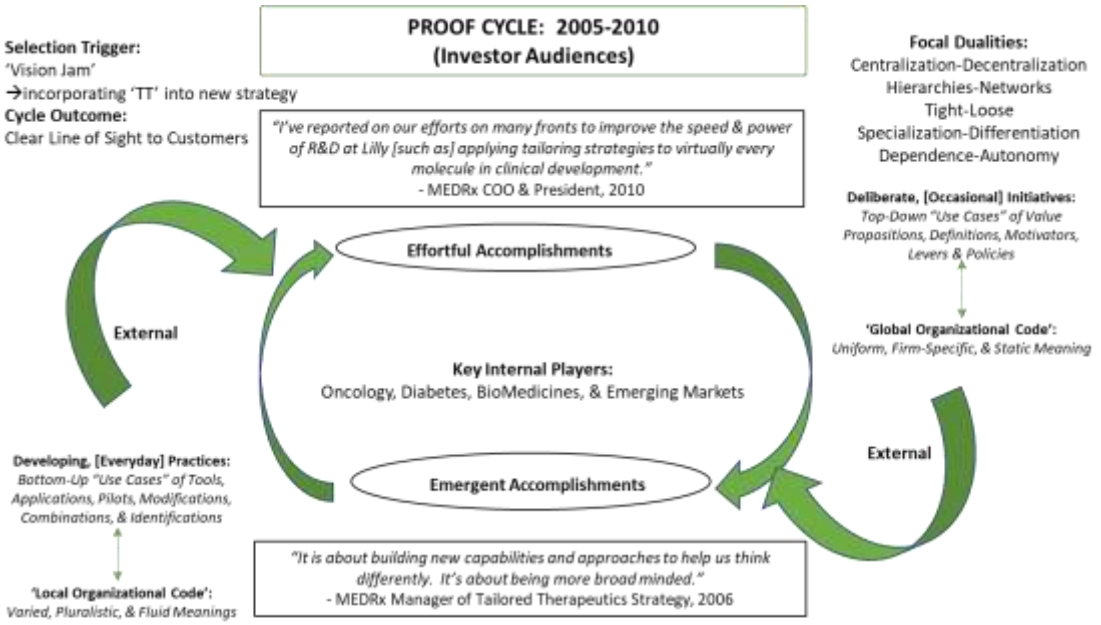
Selection: Conversation & Experimentation

- Resonance of aspects of **language** among function-specific practices and 'tailored therapeutics' legitimized, in terms of the words used/not used in public discourse

Retention: Action & Interaction

- Convergence in meaning as it relates to different aspects of 'tailored therapeutics aligning with different stakeholders so that its utility/currency is **shared** and broadened

E.3 PROOF CYCLE – INVESTOR AUDIENCES



Variation: Dialogue & Debate

- Contestation of **meaning** and divergent understandings of what being a patient-centered enterprise (focused on individual outcomes) means for each therapeutic area

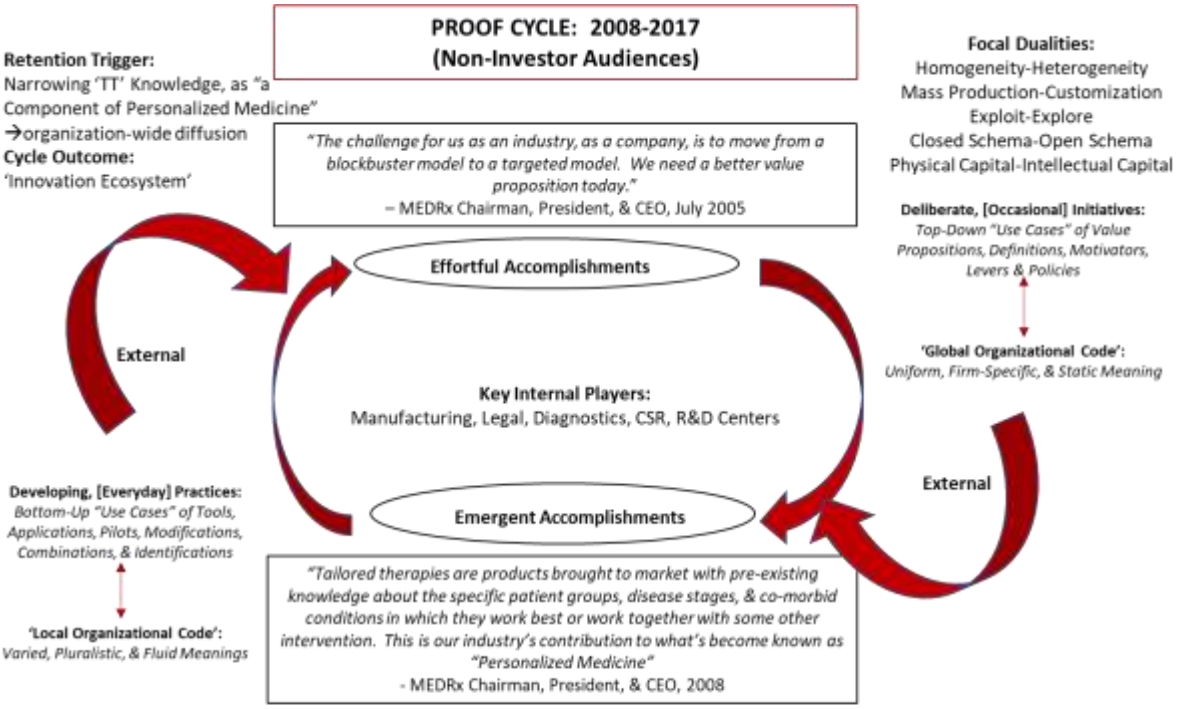
Selection: Conversation & Experimentation**

- **Resonance of language found in subsequent tailored therapeutics initiatives that improved the productivity of the current bus**iness model

Retention: Action & Interaction

- Convergence in **shared** meaning, as the utility/currency of 'tailored therapeutics' lay in its ability to improve the speed and power of R&D

E.4 PROOF CYCLE – NON-INVESTOR AUDIENCES



Variation: Dialogue & Debate

- Asking for different approaches to create new **meanings** for how each area of the organization can contribute to 'tailored therapies'

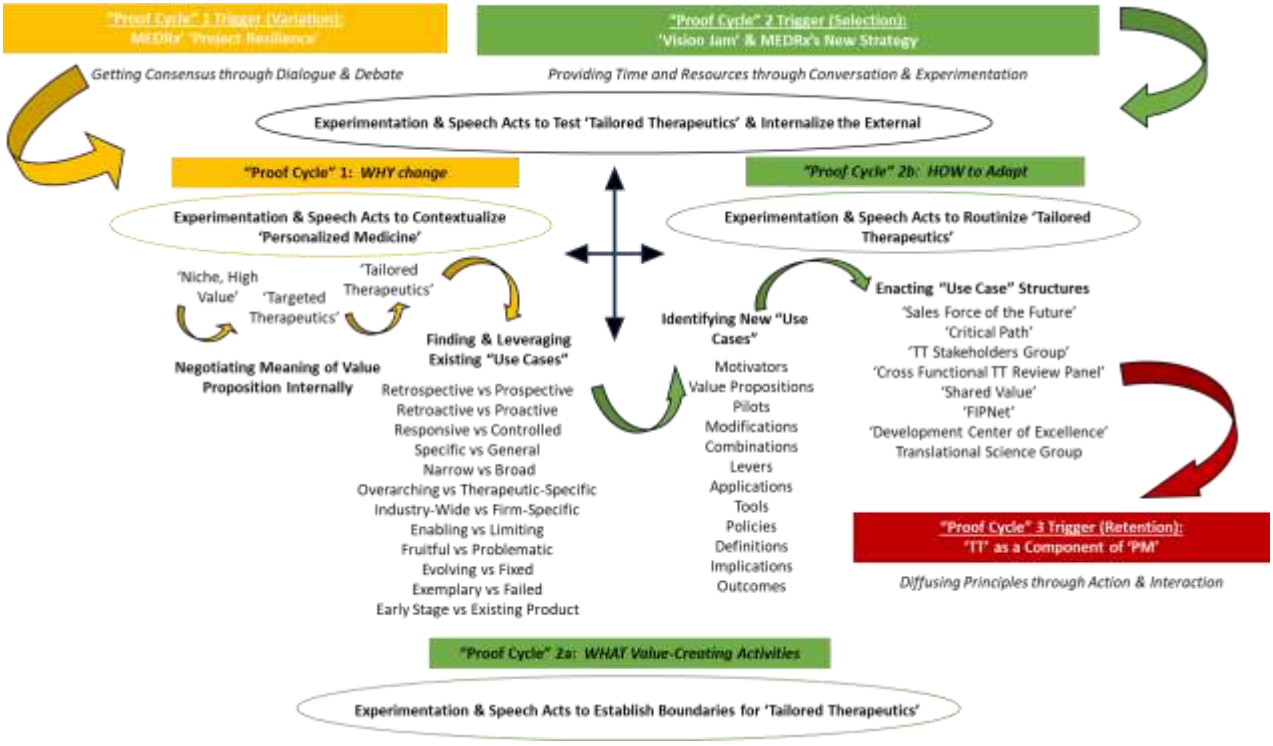
Selection: Conversation & Experimentation

- Understanding 'tailored therapies' as knowledge affects how aspects of **language** are more efficient within a broader ecosystem

Retention: Action & Interaction**

- **Convergence in meaning of 'tailored therapies' as a broader, shared value proposition**

E.5 INTEGRATION OF USE CASES AND PROOF CYCLES ACROSS AUDIENCES



APPENDIX F

ANALYTICAL MEMOS

F.1 MEMO 1 – "CUP AND PEN" STORYLINE (OF THE SELECTION PROCESS)

Storyline: ***"Cup &/or Pen"→ "The C&P Story"→ "C&P Coat of Arms"→ "Cupping it" and "Pen-like mentality"→ "Cup versus Pen"→ "Pen is just a box of shit without a cup in it"***

[Note: Local → Global [Refining Meaning/Understanding, to incorporate how the "Pen" world matters to transformation efforts] – In origination instances of teleological, but bottom-up and emergent, WAPVs (e.g. C&P) that originate in internal problem-solving contexts, the key to this language's diffusion – its evolution in becoming part of the "process" organizational code – are "use cases" emerging from: 1) current and broader field-level, strategic, situational, and work-related semantic context (emphasizing a reexamination of restructuring and reorganizing processes, associated with stages of development, e.g. late night meeting, Phases 1-4, FDA regulatory guidelines); 2) evolutionary selection via spontaneous recombination of language and visuals (e.g. "Cup and Pen"), 3) life cycle selection, or organic diffusion of negotiated meaning, through boundary spanning of inside-out, externally engaged domain experts immersed in

multiple worlds who seek to precisely match words to meaning used in external communities (e.g. FIPCo, SWRTs, "standardized business language" of MEDRx's's transformative efforts); 4) dialectical negotiation of meaning through conflict during supervisory meetings and internal problem-solving events where the meaning of the WAPVs can be contested/challenged (e.g. a job they weren't hired to do, Jack's "box of shit"), 5) inside-out and outside-in dialectical, life cycle, and/or teleological "accountability" WAPVs (oftentimes from Polymaths and/or book readings and outside consultants) to hold people to the current language needed to get work done (e.g. "TE2D", "AAL"); 6) teleological selection, or deliberate efforts, from top-down power actors (e.g. build new "Cup" facilities), 7) teleological and dialectical selection from bottom-up power actors in internal problem solving contexts to address conflict and overcome constraints (e.g. blindfolds and Mazzola corn oil in clinical trials, LRL rooms from hierarchical numbers to colors) and 8) inside-out "use cases" for the new code's value proposition (e.g. LRL reorg, "cross-functional teamwork" behind shaving off 18 months off time to market for Zyprexa and Evista). These factors increase the WAPV's local to global evolutionary capacity to diffuse throughout the organization to become part of the code and which helps the firm's members communicate, collaborate, and coordinate more effectively and efficiently around decisions and processes of reorganization and restructuring.

As highlighted in the origination story of "Cup and Pen" WAPV above, the language of C&P was deliberately generated (i.e. in late-night meeting with MEDRx directors) when visual aids on a table were spontaneously combined to address an explanation for a director's frustration in having to continually remind employees why a certain step further downstream in the discovery and development process did not need to be done yet ("*I think that is something we just absolutely don't need to know until we know we have an actual drug in our hands.")* In

essence, when the director grabbed his coffee cup and pen and said, "*Whatever I learn in making this [cup] doesn't teach me a damn thing about making this [pen],"* he was experimenting with the language surrounding problem-solving, conflict, and constraints in order to achieve operational excellence and strategic goals, such as those that had been set out in "Seven Essentials."

This first speech act in the storyline made a distinction between "this cup" and "this pen" to emphasize the fact that the first and most important question everyone in the company should be asking is: How do you make a cup? Or, rather, is this likely a drug that will be given to human beings? If the answer is no, they shouldn't be wasting any time, resources, or energy on any work "*that's going to ultimately teach you how to make a pen*." If the answer is yes, then it was time for the question: How do you make a pen? Or, rather, is this drug available for marketing and sales to go ahead and push? Thus, "Cup and Pen" was introduced as the language used to get work done. - "*…the phase of resolving whether a molecule is going to become a medicine. We referred to that as 'the Cup' and we referred to the phase of figuring out that, okay, we think we got an actual medicine here, so how are we gonna make it? What's it gonna look like? How are we gonna market it? You know, we would start on that set of ['Pen'] processes*."

Because C&P emerged from the bottom-up, in an internal problem-solving context (vs. top-down) and because C&P was a way of breaking the current "pen-like mentality," to be effective in changing "the old paradigm" [of "follow the template"], the same language/messaging needed to frequently be repeated, across multiple levels of the organization. An important factor in helping new, locally-generated words diffuse across the firm is through boundary objects in cross-unit contexts. In this case, the boundary object was the story itself, which was retold up and down one or two layers of the organization, to explain what was meant

by the "cup and pen" language. The C&P language was salient and resonated with the rest of the organization because – like everyone understanding that it took a long time to get a drug to market (making StM resonate) – everyone also understood that many of the processes they were doing were needlessly wasteful - "9 times out of 10" getting thrown out when the drug never materialized in human trials. It was common knowledge that a compound entering Phase 2 had a 20% chance of success but the odds went to 80% if it came out of Phase 2 with a Positive Product Decision (PDD) – "*this represented an inflection in probabilities and, hence, a rational point of organizational and conceptual transition to 'Cup and Pen'."* In addition, another factor driving C&P's resonance was the fact that C&P addressed the way Pharma companies approached organizing, which was being communicated and labeled across the industry as "FIPCO – Fully Integrated Pharmaceutical Company." So, while FIPCo likely came from outside the company and had originated as a way to differentiate Pharma companies from biotech, after MEDRx boundary spanners brought in this new FIPCo language – "the language of work" - they may have realized C&P's potential to better explain the value BigPharma brings in being able to integrate these tightly linked, interdependent value chain activities.

Eventually, the story no longer needed to be told. It became so abstract that "*all you really had to say was 'Cup' or 'Pen' and that was it. You know, everyone knew".* "Cup and Pen" was talked about so much that people would go home and tell their family how much their job had changed and how radically different C&P was – "*I thought I was hired to do [X]. Now I recognize I'm going to be busy doing something fundamentally different."* One such home/life situation, which ultimately led to a few C&P "coat of arms" experiments inside the company, originated from a father talking about his C&P work to his high school son. His son seemed incredulous that his dad couldn't really tell him what C&P stood for. Because of his studies in

Latin at the time, the son did an experiment with the language – he broke "Cup" into *conadu suapare populo* (implying that there's an urgency to figuring out if this drug will work in people) and "Pen" into *proemptio nuch* (implying that this drug is "for sale now"). Through storytelling, this external event eventually found its way back into the organization and evolved into localized variations of "coat of arms," where some employees would try to come up with a visual for organizationally depicting MEDRx's "Cup and Pen" work, which could be presented (e.g. on overhead transparencies) or displayed in different work areas.

These stories, word experiments and boundary objects are likely why we see so much evolution in the same type of "cup and pen" language (e.g. as noun, adjectives/descriptors – types of mentalities, points in time – and verbs). "Cupping" language was used to describe new ways of changing the way work got done (e.g. newly built labs) as well as relating it to existing code language (e.g. StM) describing how and why things get done around here. At the same time, a "pen-like mentality" was evoked to describe the previous era's "follow the template-type culture" (i.e. organizational code). From the "pen-like mentality" and verb-like thinking of "Cupping," distinctions were drawn in 4 primary areas: "the big cultural change", "the physical transformation", the unconventional [clinical trial] work practices, and the streamlining of processes that also had the effect of setting MEDRx up for achieving their "speed to market" objectives.

An example of physical transformation related to the three newly built labs/facilities for the "Cup," that had mobile furniture, glass walls, and was built around a minimal and centralized admin area to convey a fun, loose workplace (predating Silicon Valley companies). While there was all this excitement, talk, and change surrounding "Cup" and their new facilities, "Pen" was in the old facilities – "*because 'Cup' was the more radical departure. 'Pen,' in some ways,*

represented a greater continuity of what had been done before." This is likely around the same time as the 1996 LtoS that announced a major LRL reorg to refocus and realign three vital capabilities (research technology and protein discovery and development, discovery research in our therapeutic areas, and late-phase development). This is also what likely leads to an eventual "cup versus pen" mindset throughout the organization.

Around this time, there was also a new facility kickoff speech to about 500 people (including the C-suite), surrounding the construction of one of these brand-new facilities. Yet, it is important to note that, what was communicated by one of the directors who had been in the original C&P meeting, was "standard business language" (e.g. resource management) surrounding the transformative-ness of it all – "*that would be broadly understood to describe what we would be referring to internally as "Cup and Pen."* However, it was noted that this is likely because the director's boss (who, many years later would become CEO), who had also been in the late night meeting, had senior suite access and had already likely conveyed the "Cup and Pen" story to the C-suite execs…so the purpose of the meeting was more of a strategic discussion focused on the changes and how things would be different.

An example of the cultural change is reflected in the team room labels, that had originally been numbered 1, 2 & 3 but, on the very first day, the scientists said "*No, it feels like a hierarchy. And we don't want any part of that."* So they scraped the numbers off with razor blades and relabeled them green, blue, and red so that nobody could argue that someone's role was different from another's (i.e. they were all there to figure out how to make a cup). While the new physical facilities and the room relabeling predated the "big cultural change," it was noted that it did a lot toward "*streamlining and setting us up for doing these things right*." Thus, C&P also became a tool to change the culture around always just following the template – "*And the*

cultural change that Cup & Pen brought in was…You challenged things. You asked questions – 'You want to what? Why do you want that? What are you going to do with that? I don't think you need it'."

An example of the unconventional work practices in running clinical trials that "Cup" would do differently than "Pen" (e.g. in Phase 3 clinical trials) included actual blindfolding the patient instead of the drug (i.e. placebo) and using Mazzola corn oil instead of "fancy-shmancy excipients" to dissolve drugs in. – *"We did things that were out of the norm, in the 'Cup' world, and the 'Pen' world continued to more play by the rules…the prior rules because they were the ones who were bringing this to market. They were the ones we were just looking to tell whether it was going to be a success or not. And they were the ones that were going to have to live with the success or failure for the next 10 years while we had it on patent. And so they tended to follow more of that old school. The difference was really that the 'Pen' mentality had crept so far upstream that we no longer did real experiments. We did these elaborate design studies that, you know, would pass muster instead of just answering our questions."* [this seems to be more a reference to the previous code era of "follow the template". Per Sue: I definitely heard the part in yellow as a reference to the previous era – how drug discovery had previously followed too much the structured process used in development – and they realized that they wasted a lot of time filling out paperwork, conducting tests too early in the process, because they thought they were nedded when they really, often, were not necessary]

An example of the streamlining (that was also aligned with the 7E and StM initiative) was identified in the practices that spanned the whole expansion of "Cup and Pen" – from the drug molecule preparers, to the formulators, to the administration, metabolism, and excretion (AME) testers, and to the toxicologists running the specs on humans from Phase 1 and beyond.

In the past, one of the groups would send a nuclear magnetic resonance (NMR) spectrum to the molecule group, who would, in turn, mail it to toxicology. Toxicology would then roll it up in an Appendix in their reports they'd assemble and send off to the FDA. But when the company started talking "Cup and Pen", both groups realized that the NMR spectrum did not need to be done that early in the process. It could be postponed until they were presented with more interesting data that "this is looking more drug-like." – "*At times, cutting waste out, lowering costs. The kinds of things that are always on the Executive's mind. It doesn't have to have the Chairman say the "Seven Essentials" for them to realize that 'Gee! If I could do this more cost effectively, I'd be doing my job better'*."

C&P was also used to recruit and/or "call people out" on doing the wrong line of work (e.g. "*if they were qualified, we asked them to focus on 'Cup'")* as well as on doing unnecessary things or things too early. For example, there were instances of employees who approached directors, expressing concern that they weren't sure they could do their job, because it wasn't the "soup to nuts" job they were hired to do – *"All of a sudden they were going to be given one critical question to answer: Is this molecule a medicine? And if they did extraneous things in the course of [figuring that out] then someone was going to call them on that and say, you know, we really need to focus our resources on answering that question as rapidly as possible, and as many times as possible, in order to provide the most medicines as possible."*

Because of this internal event, the leadership teams started to think about what is special about the "Pen" world and announced to senior management/superiors why they were going to be making some changes (but not in the same graphic language). They also thought more about how they could improve interactions with marketing so that when the time came, it would be a more "s*eamless transformation of a research oddity into a marketed medicine that, you know,*

changes lives." This is likely why we see in a 1996 LtoS a focus on "*reemphasizing excellence in the basics of selling"…*as a result of Jack's "box of shit" comment/plea to make further delineations in the "Pen" stages.

Eventually, the C&P language caught on in marketing and sales – "*a marketing guy would come and say, 'Well, is this the 'Cup' phase or the 'Pen' phase? And it just became the way that we referred to the stages of development, which, for all practical purposes meant, 'Do I have Phase 2 positive data? If I don't yet have positive data in a phase 2 clinical trial, it's in 'Cup.' If I have positive data in the Phase 2 clinical trial and I haven't killed the drug, it's in 'Pen'*." [How does this quote on the language used to define the point in time - the boundary between "Cup and Pen" - also relate to and/or acknowledge the language of 7E's portfolio management decision making processes revolving around the language of science/data as well as the language of DwW's innovation search processes related to Chorus' "truth-seeking" versus "success-seeking"??] An example of how the cultural and process changes spanned the whole range of C&P and influenced development and marketing is related to the use of "SWRTs – Single, white, round tablets." This acronym came about after realizing that every time a product was brought to Japan, they would ask for it to be reformulated because the "designer dress" mentality of coloring and designing drugs in the U.S. did not resonate well with the Japanese, who felt like colored pills weren't medicine – "*And so we started saying SWRTs and, you know, we're just gonna talk about this unless its SWRTs*."

The evolution of the unique WAPVs ("Cup and/or Pen," "C&P Story," "C&P Coat of Arms," "Cupping it", "Pen-like mentality," "Cup versus Pen," "Pen is just a box of shit without a cup in it.") and the patterns outlined above – related to the origination/variation of new WAPVs and the selective filters used to enact new language and/or enrich its meaning – describe the language

MEDRx members used to communicate, collaborate, and coordinate about making the processes of getting drugs to market more efficient. I believe this firm-specific language ultimately got retained in MEDRx's shared understanding surrounding organizing and structuring decisions.

F.2 MEMO 2 – "SEVEN ESSENTIALS" STORYLINE (OF SELECTION PROCESS)

Storyline: ***"Seven Essentials" → "Speed to Market"→ "MEDRx 2500" → "the Patient is Waiting"***

[Note: Global → Local [Enriching Meaning/Understanding, from just speed to include human element] – In origination instances of teleological (top-down, deliberate, and strategic CEO-driven) WAPVs (e.g. 7E), the factors influencing this language's situated resonance and salience – its evolution in becoming part of the "process" organizational code – are "use cases" emerging from: 1) current and broader field-level, strategic, geographical, and work-related semantic context (emphasizing a reexamination of project decision-making and portfolio management processes, e.g. StM, "moving on", L2500, PiW); 2) life cycle selection, or organic diffusion, of an outside-in personal/life event that happened to an organizational "power actor" (making the language more meaningful and understandable, e.g. Prozac/suicide of CEO's wife→PiW); 3) teleological selection based on internal problem-solving and spontaneous recombination of language and visuals (boundary objects, e.g. PIW & poster of patient skeleton in Dr office); 4) inside-out and outside-in teleological, evolutionary and dialectical "accountability" WAPVs (oftentimes from outside consulting firms or book readings) that hold people to the current

strategic objectives and values or question existing values (e.g. "LO", Covey's "7 habits"), 5) externally engaged domain experts who speak to the "data of science" (e.g. "data geniuses") or standardized business language (e.g. "risk, reward, opportunity, timing, and cost"), and 6) inside-out legitimacy "use cases" for the new code's value proposition (e.g. "days" to market milestones from L2500 target, advertised in annual report). These factors increase the WAPV's global to local evolutionary capacity to diffuse throughout the organization to become part of the code (in the direction of the senior leaders' intent) and which helps the firm's members communicate, collaborate, and coordinate more effectively and efficiently around decisions and processes of project and portfolio management.]

As highlighted in the origination story of "Seven Essentials" WAPV above, 7E came about from the 18-month CEO, to establish the strategic objectives and the values the corporation would live by. This language could have resonated and been more influential due to the fact that it was similar to and/or a play off of Covey's book "7 habits of highly influential leaders" (published in 1989). [However, Interviewee1 mentioned that some of the other things MEDRx was pushing at this time (e.g. "Cup and Pen") deviated from some conventional wisdom coming from Covey's "7 habit franchise" such as the notion of "beginning with the end in mind."] That particular CEO was soon, thereafter, replaced by the company outsider CEO, who continued to push the 7Es and turned them into more specific strategic initiatives, such as "Speed to Market."

This new WAPV of StM helped select the language of 7E into active attention (primarily from the top-down) because it resonated with 7Es' salient values and objectives. In the current strategic context, it was a well-known fact that it took a long time (often 10-12 years) to get a

drug to market. Thus, "Speed to Market" further highlighted salient aspects of shared experience and challenges across the organization, and industry at large.

However, there were challenges in getting folks (particularly MEDRx's scientists and heads of the different therapeutic areas) on board to collaborate to speed the process along – "moving on". Even though one would expect a democratic process to work well in making decisions regarding which molecules to move forward and which to terminate, there were still conflicts of interest. Related to this seemed to be the analogy of Tragedy of the Commons to finite corporate resources when selecting which TA project would get the resources for that 'go around'. In these situations, the decision-making process was facilitated by the language of science – data – and "*managing complex information in real time*." Thus, the "data geniuses", externally engaged domain experts, who could quickly and effectively pull up "fresh" information on hand and display it in different visual ways (as boundary objects) proved to be very effective in enabling the scientists around the table to more easily communicate. By making the conversation flow better, they could then debate on the "3 things that really matter," and/or the 5 levers to communicate to the C-suite level about a product/concept's potential – "risk, reward, opportunity, timing, and cost." This skill set was immensely helpful in "*managing large groups of very, very smart and opinionated people."*

Another aspect of MEDRx's context – the geography/location of their HQ – influenced the language surrounding the StM initiative. As MEDRx leaders were coming up with a formalized way to bring StM to fruition, they set targets. Because of their close proximity to the Indy 500 races, "MEDRx 2500" emerged as concrete target/stretch goal (for the # of days they were working towards in getting a drug to market) that everyone in MEDRx could get around and support. Because L2500 resonated with the local culture, it became how they were going to

achieve StM. [around this time, there were "use cases" identified in the 1995+ letters to shareholders surrounding the language of L2500 – they would highlight a shift/reduction in the number of *days* (as opposed to months or years) it was taking to get their drugs to market.]

Perhaps what did the most to generate new words and locally diffuse 7Es, StM, and MEDRx 2500 across the firm was the CEO's personal life experience – the death of his wife in May 1994 – which he transparently communicated both internally and externally (in 1994 LtS). His wife suffered from clinical depression, and, although she tried to seek help, it had been too late and was not enough to prevent her from committing suicide. This was a traumatic life event for the CEO. In addition, it related to the leading role MEDRx had in neuroscience, in particular depression, with the more recent discovery of the molecule/drug, Prozac, and the use of the selective serotonin reuptake inhibition mechanism (which "*transformed not only MEDRx but other drug companies, from being something very different than they were before we had that.").* This event also could explain the shift in strategic focus (from CEO's earlier letters to shareholders) on disease management and integrated solutions back to getting results in the area of pharmaceutical innovations that MEDRx was a leader in – "Prozac changed everything. And that was just the beginning." ("*to incorporate disease management as a component of our innovative solutions."* 1996 LtoS)

This event is also what likely influenced the emergence of the phrase, "the patient is waiting," to just "pop up" in a meeting. PiW added the human element to StM, emphasizing why it was important to speed up the processes related to getting MEDRx drugs to the market faster. This provided the impetus to help shift the attention of MEDRx scientists - "wired for science," who tended to want to do one more project…to make the science better - more toward the processes they could speed up (e.g. decision making involved in selecting which molecules to

move forward and which to end). During this time, somebody in R&D who had heard the phrase and thought it was interesting found a little poster related to the wait times at hospital – it showed a patient that had already decayed to a skeleton sitting in a waiting room. That visual image was relatable to everyone who had ever waited in a doctor's office before and acted as a boundary object that was able to take the PiW phrase and perpetrate it throughout R&D discussions. And because the poster resonated so well with everyone in the organization and could be copied, printed, replicated, etc., it was able to spread beyond R&D throughout the whole company, along with the PiW phrase.

The enactment of the PiW phrase in bridging contexts (e.g. cross-unit decision making between R&D and marketing) further highlights the salience and resonance of PiW with MEDRx's shared values and objectives. For instance, after PiW had spread to the marketing side, when a marketing guy/gal would ask for an answer from someone in the R&D team by next week and was told "No, it's going to take me three weeks to get to it," they could then reply back "Hey! The patient is waiting!"

Another factor that contributed to the PiW WAPV being retained in practice and values, was the introduction and boundary-spanning potential of new language brought into the organization either from new hires, consultants, and/or current employees who had been influenced by external themes/events (e.g. from books, business trends, etc.). For example, in addition to "the patient is waiting," there were phrases "bouncing around" MEDRx like "the learning organization," "already always listening," and "quality/lean/agile" that, while not always unique to the firm, were common phrases used a lot within the company to hold people accountable to the strategic objectives and the values the company strived to live by – "*When somebody would say something and someone else would frankly want to put them in their place*

by saying, 'Is that consistent with [a particular WAPV]?' or 'Are you forgetting the patient is waiting?' These became little bludgeons that can be used because there was enough shared understanding that if you said it, everyone in the room would nod their head and go, 'Oh yeah, you forgot the patient was waiting' or 'You forgot we were supposed to be a learning organization.'" Thus, salience and resonance were also outcomes of the spontaneous recognition of situation-specific utility –"ha! Now I find "PiW" useful because I can hold you hostage with it!")

The evolution of the unique WAPVs (7E, StM, L2500, and PiW) and the patterns outlined above – related to the origination/variation of new WAPVs and the selective filters used to enact new language and/or enrich its meaning – describe the language MEDRx members used to communicate, collaborate, and coordinate about speeding the processes of getting drugs to market. I believe this firm-specific language ultimately got retained in MEDRx's shared understanding surrounding project and portfolio management decisions.

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